# Lisa
# Owner's Guide

## Beta Draft

apple computer

# Lisa Owner's Guide

CONFIDENTIAL
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FCC warning <<to come>>

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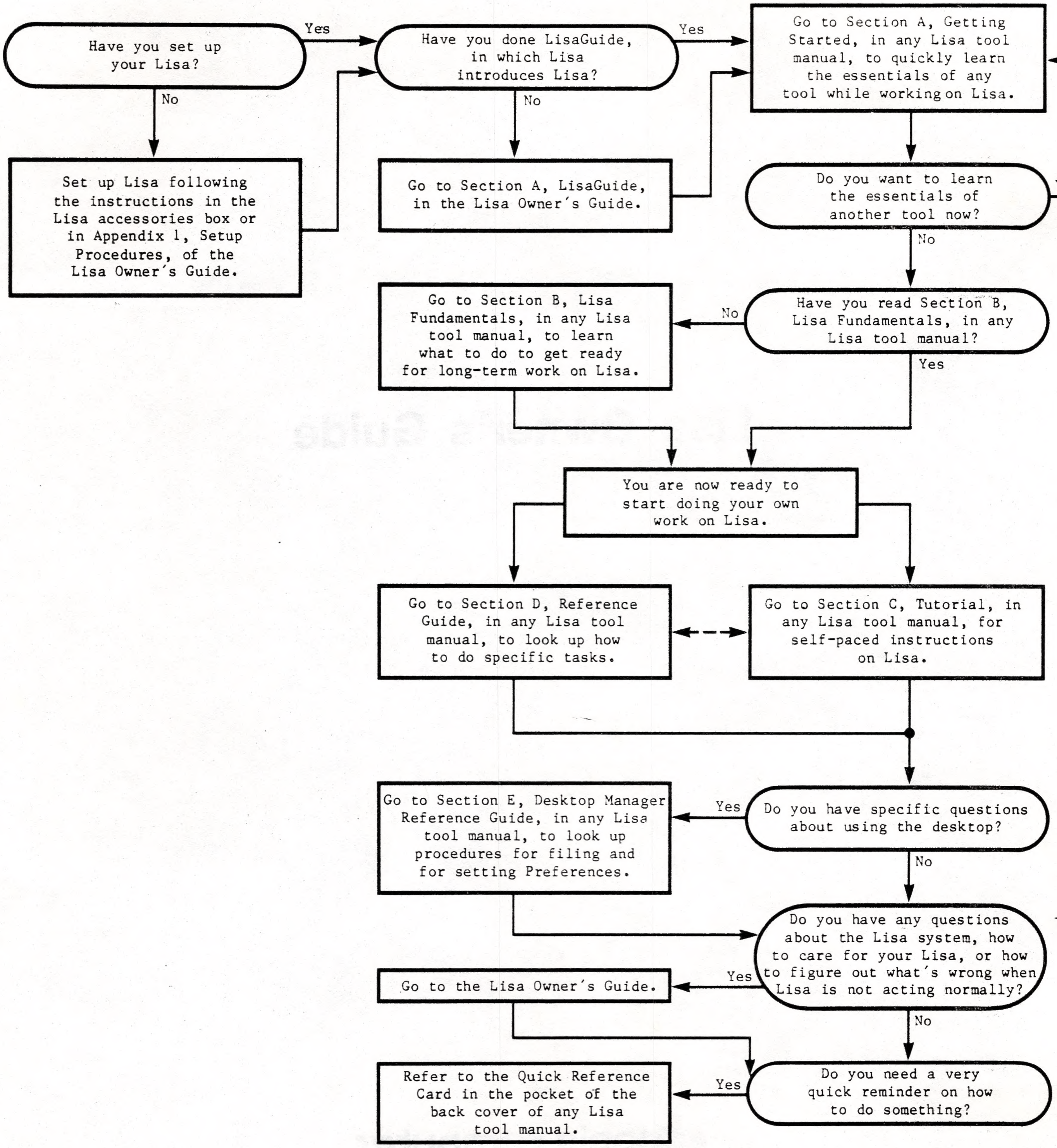
# Lisa Owner's Guide

apple computer
20525 Mariani Avenue
Cupertino, California 95014

# Map To Lisa Manuals


Have you set up your Lisa?
Yes
No
Set up Lisa following the instructions in the Lisa accessories box or in Appendix 1, Setup Procedures, of the Lisa Owner's Guide.
Have you done LisaGuide, in which Lisa introduces Lisa?
Yes
No
Go to Section A, LisaGuide, in the Lisa Owner's Guide.
Go to Section A, Getting Started, in any Lisa tool manual, to quickly learn the essentials of any tool while working on Lisa.
Do you want to learn the essentials of another tool now?
Yes
No
Have you read Section B, Lisa Fundamentals, in any Lisa tool manual?
No
Yes
Go to Section B, Lisa Fundamentals, in any Lisa tool manual, to learn what to do to get ready for long-term work on Lisa.
You are now ready to start doing your own work on Lisa.
Go to Section D, Reference Guide, in any Lisa tool manual, to look up how to do specific tasks.
Go to Section C, Tutorial, in any Lisa tool manual, for self-paced instructions on Lisa.
Do you have specific questions about using the desktop?
Yes
No
Go to Section E, Desktop Manager Reference Guide, in any Lisa tool manual, to look up procedures for filing and for setting Preferences.
Do you have any questions about the Lisa system, how to care for your Lisa, or how to figure out what's wrong when Lisa is not acting normally?
Yes
No
Go to the Lisa Owner's Guide.
Do you need a very quick reminder on how to do something?
Yes
Refer to the Quick Reference Card in the pocket of the back cover of any Lisa tool manual.

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Preface

A. LisaGuide

This section introduces you to Lisa.

B. This Is Lisa

This section covers the major Lisa components and explains how they interact.

C. Maintenance

This section explains routine maintenance -- mostly how to clean the system.

D. Troubleshooting

This section is a step-by-step guide to identifying the problem when your Lisa doesn't do what you expect. It will help you understand the problem so that you can fix it yourself, if possible.

E. Service

Once you have found the source of a problem, this section will either guide you through the repair process or tell you where to go for help.

F. Appendix

Appendix 1. Setup Procedures

Refer to this appendix when you are setting up Lisa. These instructions appear as a separate sheet in the Lisa accessories box, and they are repeated here for future reference.

Appendix 2. Handling Diskettes

Read this appendix to learn about caring for diskettes.

Appendix 3. Automatic Startup Tests

Refer to this appendix if you want to know what is happening during the first few seconds of system startup or when you are trying to interpret a startup error message. You may be directed to this appendix by Section D, Troubleshooting.

Appendix 4. On-Off Procedures <<to come>>

Read this appendix for a summary of how Lisa's on-off button works.

Appendix 5. Hardware Specifications

Refer to this appendix for information on the size, weight, hardware compatibility, and other hardware specifics of Lisa.

Appendix 6. Moving and Storing Lisa <<to come>>

Refer to this appendix when you plan to move or store Lisa.

G. Glossary <<to come>>

H. Index

# PREFACE

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The Lisa Owner's Guide contains:

- A brief introduction to Lisa's components and special features.

- Suggestions for keeping the system clean and problem-free.

- Detailed instructions for diagnosing and repairing problems.

Before beginning long-term work on your Lisa, look over Section B, This Is Lisa. Scan the contents of Section C, Maintenance, so that you will know which parts of Lisa you can clean. Review the descriptions of the appendixes and note the ones that are important to you. Then keep this manual with your Lisa and refer to it whenever you need more information. If something goes wrong, refer to Section D, Troubleshooting, and Section E, Service.

This owner's guide is intended to be used in conjunction with the manuals that come with the Lisa tools. For system information not covered in this manual, refer to Section B, Lisa Fundamentals, in any Lisa office tool manual, or to the Lisa Development System manual.

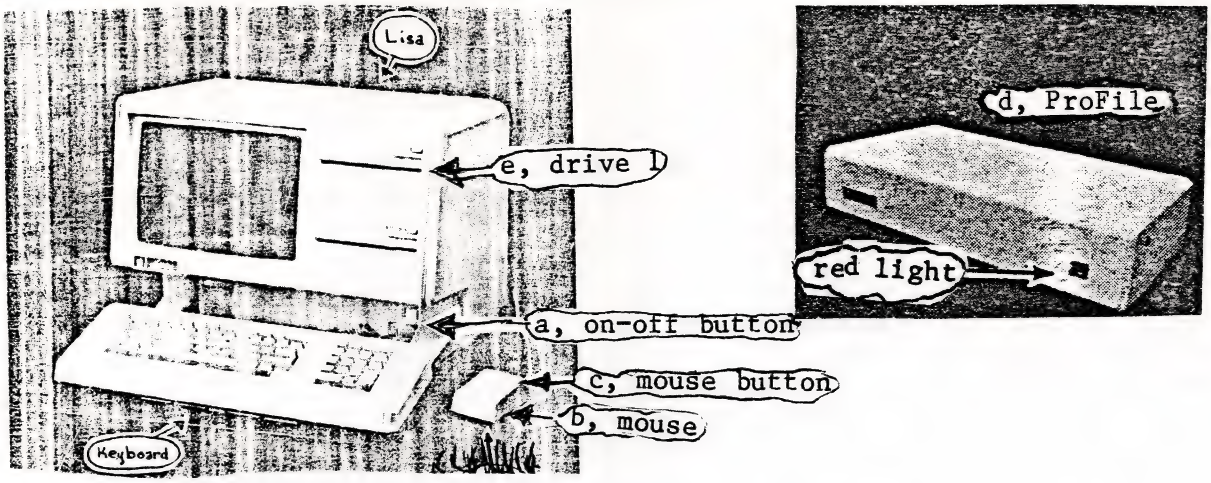
A

LisaGuide

# Section A

# LisaGuide

# LisaGuide: Learning about Lisa



Lisa is like an "electronic desktop" -- a personal office system that works much the same way you're already used to working.

The diskette named LisaGuide contains exercises, demonstrations, and examples that will teach you Lisa's basic operations. LisaGuide's exercises are grouped into these topics:
Of Mice & Menus
Starting a Document
Editing a Document
Filing a Document
Viewing a Document
Stopping LisaGuide
More Editing - Optional
More Filing - Optional
Shortcuts - Optional
Summaries - Optional

It takes about 30 minutes to complete the first six LisaGuide topics. We recommend you complete these six topics in the order shown. You can complete the optional LisaGuide topics at any time.

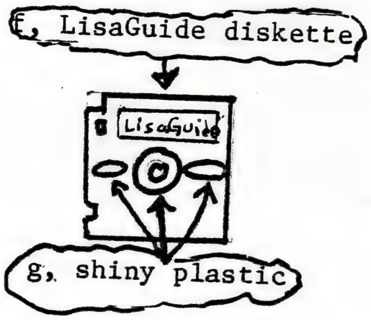
Once you've completed the first six LisaGuide topics, you'll have learned Lisa's basics and be ready to begin working on whatever type of document you wish.

## To Start LisaGuide for the First Time

1. Set up Lisa. See Appendix 1, Setup Procedures, in this manual.

2. Be sure Lisa's power is off: If the on-off button is lit, press it once (see a).

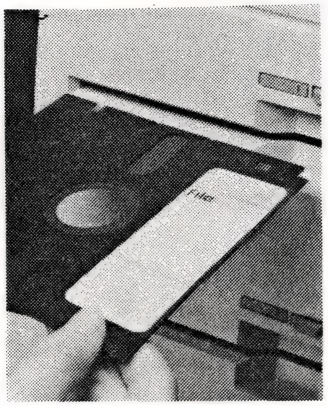
3. Remove any diskette that Lisa ejects from drive 1 (h). Don't touch the shiny plastic (g).



4. Remove the LisaGuide diskette from its pocket inside the front cover of this manual, and place it in drive 1 (e). Don't touch the shiny plastic (g). Make sure the cutout parts of the diskette are oriented as shown in the photograph (h). Push the diskette into the drive until you hear a click.

   NOTE: If the power is ON when you put LisaGuide in the drive, you'll see a message asking if you want to initialize the diskette. Do this:
   - Move the mouse (b) on your desktop until the arrow-shaped pointer on Lisa's screen is over the word "Cancel" that is in the box with the message.
   - Press and release the mouse button (c) once.
   - Start over at step 2, turning off Lisa's power.

5. Be sure the Profile is turned ON: If the ProFile's red light is not glowing or flashing, press the on-off switch on the back of the ProFile to On.



h, insert or remove a diskette

6. Turn on the Lisa's power: Press the on-off button once. The power will go on, and the button will light up.

7. It takes a few minutes to get LisaGuide ready. When the screen says "Welcome to LisaGuide," read and follow the instructions on the screen.

## To Stop LisaGuide at Any Time

1. Hold down the key with the picture of an apple (it's to the left of the space bar) while you press the period key.

2. When Lisa ejects the LisaGuide diskette, remove it and replace it in its pocket inside the front cover of this manual. After a few minutes you'll see Lisa's "usual" desktop without LisaGuide.

## To Restart LisaGuide

1. Follow steps 1 through 6 under "To Start LisaGuide for the First Time."

2. When "Welcome to LisaGuide" appears, choose the topic you're interested in from the Topics menu.

# B

# This is Lisa

# Section B

## This Is Lisa

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System Components ______ B2

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  - Disk Drives B8
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# THIS IS LISA

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This section introduces the major Lisa components and explains how they interact. Read the individual discussions in this section for details that will help you use Lisa easily and comfortably.

This section is concerned only with the physical parts of Lisa. If you are using one of the Lisa office tools, you will find the background information on using your system in Section B, Lisa Fundamentals, in the manual that came with any Lisa tool. If you are using the Lisa Development System, refer to the System Manager section of the Lisa Development System manual for detailed descriptions of the utility programs and the standard interfaces.

Directions for setting up Lisa came separately in the Lisa accessories box. For your convenience, these instructions are repeated in Section F, Appendix, under Appendix 1, Setup Procedures.

## SYSTEM COMPONENTS

Lisa's system consists of three separate parts: the keyboard; the mouse; and the cabinet containing the computer itself, the video screen, and the disk drives. Figures 1 and 2 show the front and back views of Lisa.

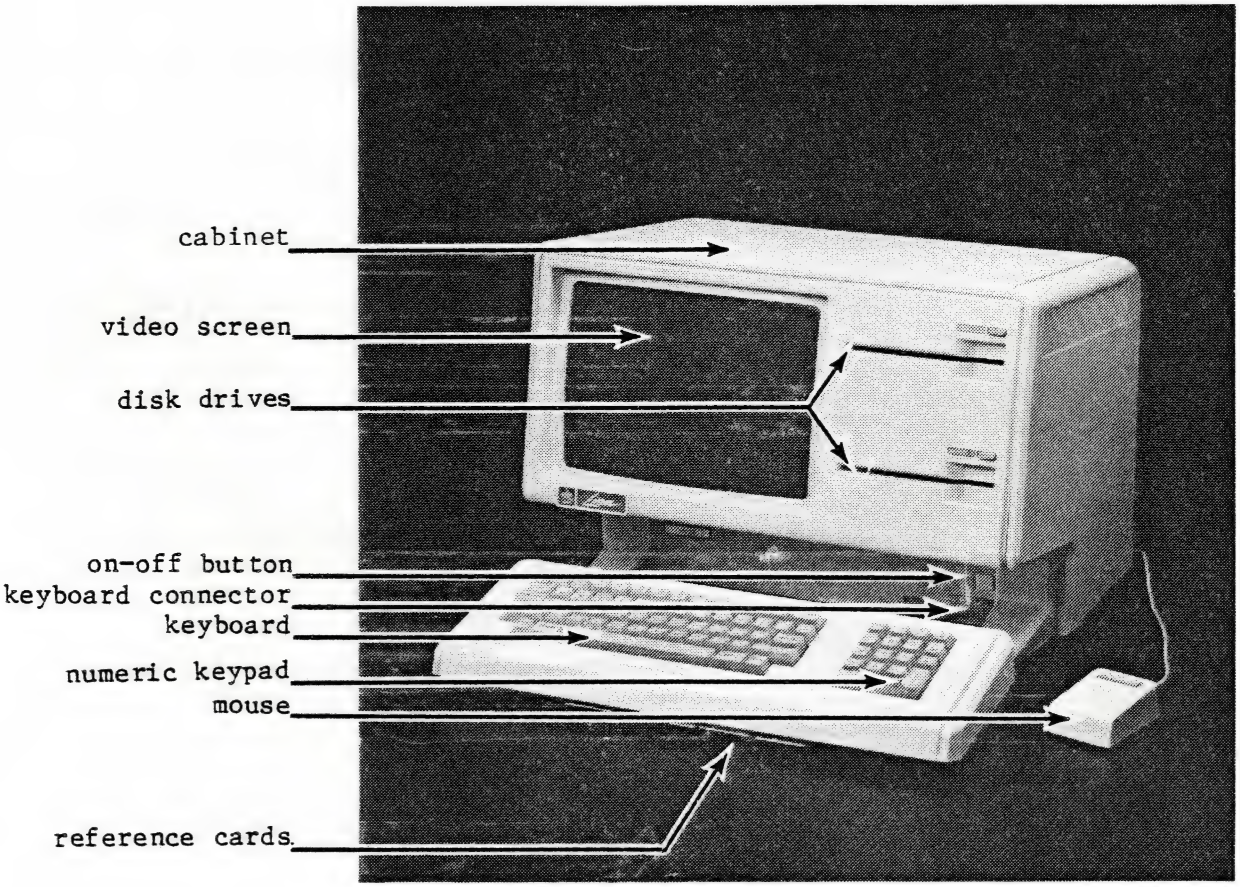


Figure 1. Lisa, Front View

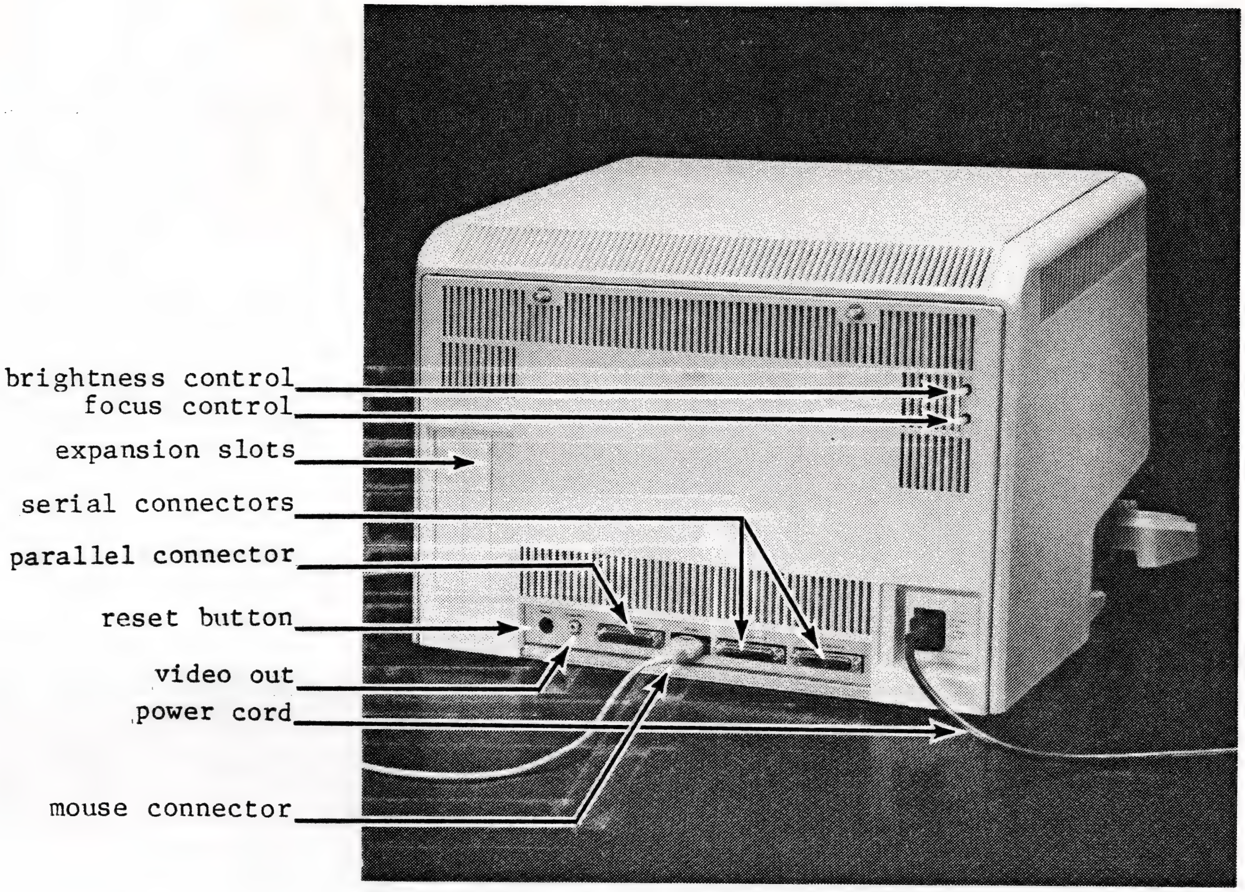
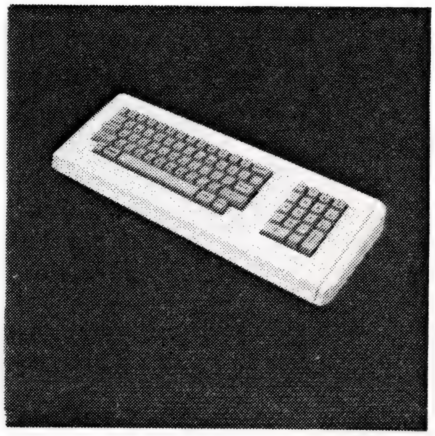


Figure 2. Lisa, Back View

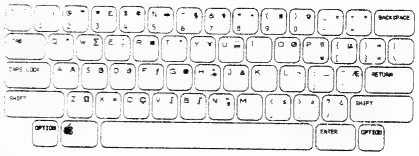
## Keyboard

Lisa's keyboard is much like a typewriter keyboard, with a few additional keys.

The functions of the [CLEAR], [ENTER], [*], Apple, and arrow keys depend on the Lisa tool you're using; they are described in the manuals that come with the Lisa tools. The [CAPS LOCK] key is like [SHIFT], except that it affects only the letter keys, not the number or punctuation keys.

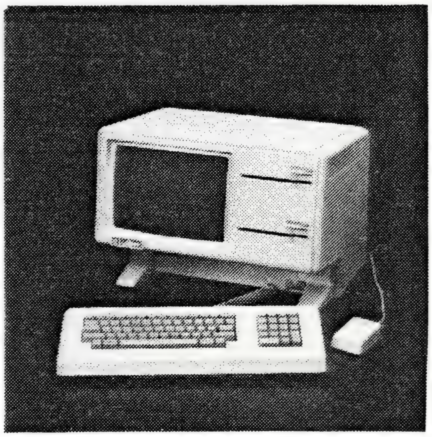


The [OPTION] key, which is like a [SHIFT] key, gives you access to a set of special symbols and international characters. These characters are displayed on a pull-out card stored under the keyboard. To type one of the special symbols, hold down the [OPTION] key while pressing the key for the symbol you want.

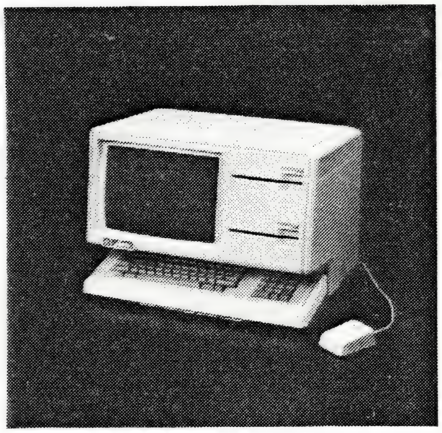


All letter and number keys on Lisa's keyboard repeat automatically when held down. You can specify the time lag before the keys start to repeat and the rate at which they repeat. Instructions for making these adjustments appear in Section E, Desktop Manager Reference Guide, in the manual that came with any Lisa tool, under Set Convenience Settings, and in the System Manager section of the Lisa Development System manual.

The keyboard is attached to Lisa by a flexible cable so that you can put the keyboard on your lap or wherever it is most comfortable and convenient while you're working. The maximum safe extension of the cable is 4 feet.



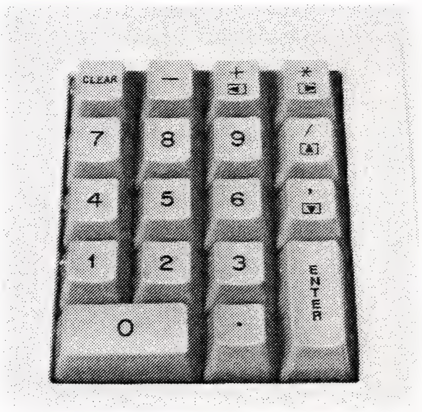
When you are not using your Lisa, you can save space and protect the keyboard by sliding it under the front of the cabinet.



A plastic spill shield under the keys protects the electronic parts inside the keyboard from moisture. For instructions on cleaning the spill shield, see Section C, Maintenance.

## Numeric Keypad

The numeric keypad on the right side of the keyboard is for your convenience when entering numbers and equations; pressing these keys has the same effect as pressing the corresponding symbols on the main keyboard.



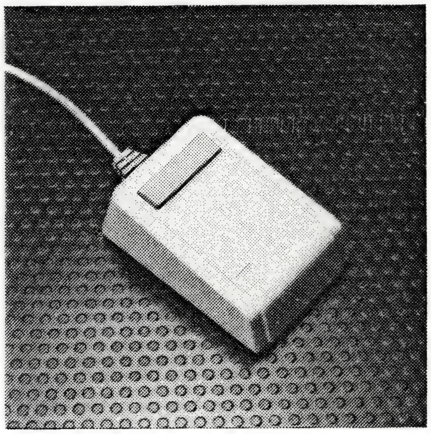
## Reference Cards

The reference cards under the keyboard hold two kinds of information:

- The top card displays the alternative keyboard layout.
- The bottom card contains details about your Lisa and your support agreement. If your dealer did not fill in this card when you purchased your Lisa, you should fill it in now so that the information will be handy when you need it.

## Mouse

Like the keyboard, the mouse is a device for communicating with Lisa. Rolling the mouse along a flat surface moves a pointer on Lisa's video screen; pressing the button on top of the mouse selects text and objects on the screen.

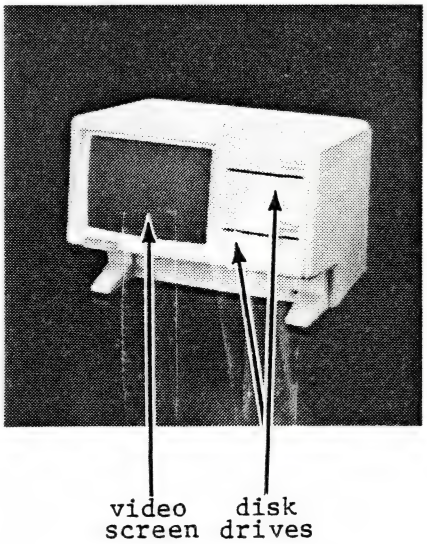


The mouse is quite sturdy and can tolerate a lot of rolling and button-pressing. However, a sudden impact could damage the sensors inside. Avoid dropping the mouse or hitting it against hard objects.

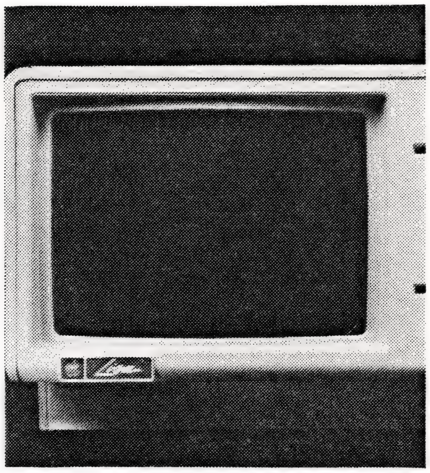
Instructions for cleaning the mouse appear in Section C, Maintenance.

## Cabinet

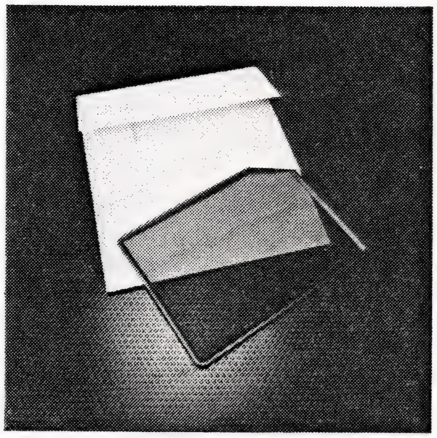
The cabinet contains the computer itself, the video screen, and the disk drives. It also contains the power supply. To prevent electrical accidents, both the front and the back panels of the cabinet are equipped with safety interlock switches. You should always turn off and unplug Lisa before opening the cabinet. If you do remove either panel while Lisa is running, however, the safety switches cut off all power immediately.



## Video Screen



The brightness and focus of Lisa's video screen are controlled mechanically; the contrast is set through Lisa. Instructions for setting the brightness and focus appear under Screen Controls, later in this section. Instructions for setting the contrast through Lisa appear in Section E, Desktop Manager Reference Guide, under Set Brightness and Contrast, in the manual that came with any Lisa tool, and in the System Manager section of the Lisa Development System manual.



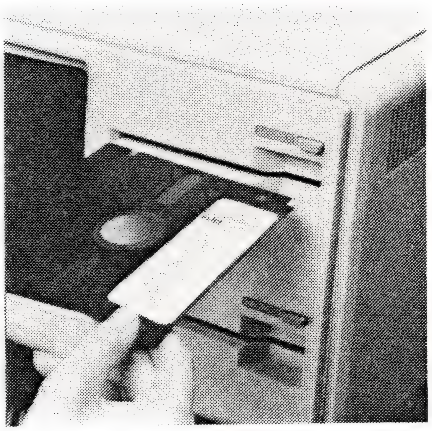
A special glare filter was packaged with your Lisa. In most environments the filter is unnecessary, but sometimes windows or overhead lights can cause irritating reflections on the screen. If screen glare is a problem for you, install the filter according to the instructions in Section E, Service. After you install the filter, you will have to readjust the screen contrast.

After many hours of exactly the same display, video screens are subject to burn-in: the screen picks up a permanent image that is the negative of the display. To protect against burn-in, Lisa dims the screen if no activity has taken place for several minutes. Instructions for setting the time lag before dimming and the contrast level of the dim display appear in Section E, Desktop Manager Reference Guide, under Set Convenience Settings, in the manual that came with any Lisa tool, and in the System Manager section of the Lisa Development System manual.

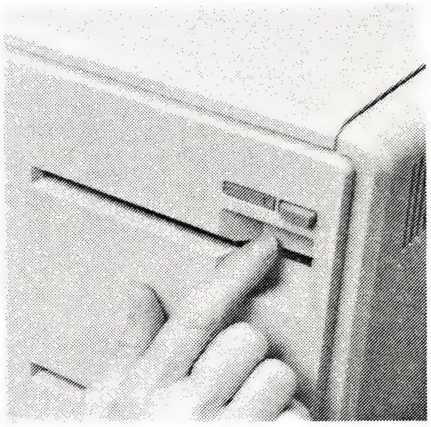
## Disk Drives

Lisa's two built-in disk drives accept special, 5-1/4-inch floppy diskettes. When you buy blank diskettes, be careful to get diskettes that are compatible with Lisa's disk drives.

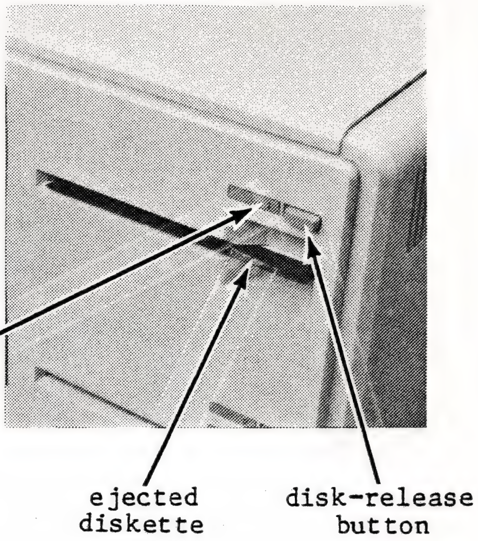
Insert diskettes into the drive slots with the printed label facing up on the right and the notched corner on the right. (Do not touch the exposed, shiny surfaces. See Appendix 2, Handling Diskettes, for recommended procedures for handling and storing diskettes.)



Push the diskette into the drive gently. You can feel resistance from an internal spring for the last 1/2-inch or so. When the diskette is in place, you can hear the disk drive clamp onto the diskette. If Lisa is on, you can also feel the vibrations of the spinning disk. Once a diskette is in place, do not try to pull it out until it is released by the drive.



One disk-release button is located above each drive slot, to the right of the drive number. When you want to remove a diskette, press the disk-release button and wait for Lisa to eject the diskette. There may be a delay of up to 1 minute while the computer updates and releases the diskette.



## On-Off Button

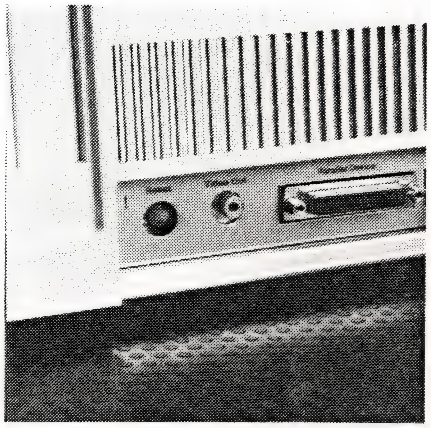
Press the on-off button when you want to turn Lisa on or off. When Lisa is on, the on-off button is lit.

Pressing the on-off button when Lisa is on does not instantly shut it off. The on-off button triggers a series of disk-storage procedures, followed by a cutback of power to standby levels. See Appendix 4, On-Off Procedures, for a description of the startup and shutdown sequences.

## Reset Button

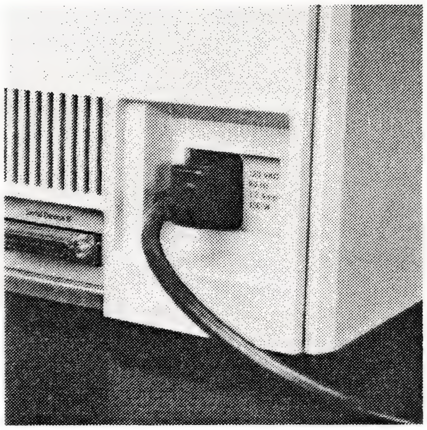
The reset button is a backup device for use when the normal shutdown procedures go awry or when Lisa doesn't respond to the keyboard or mouse. The use of this button is discussed in Section D, Troubleshooting, and in the Lisa Development System manual.

Under ordinary circumstances, do not press the reset button.



## Power Cord

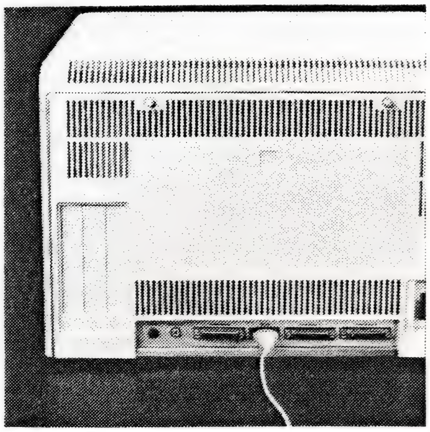
As long as Lisa is plugged in, it draws a small amount of power, which it uses to keep the clock/calendar up to date and to remember some information about your Lisa. A battery inside Lisa can power the clock and parameter memory for up to 20 hours so that you can move and service the machine without resetting all system information.



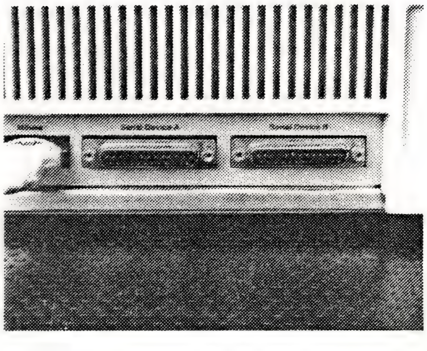
When you must unplug Lisa, first push the on-off button and wait for the light to go out before pulling the plug. When you are done, reinsert the plug as soon as possible, even if you do not need to turn Lisa on again.

## Connectors for Extra Devices

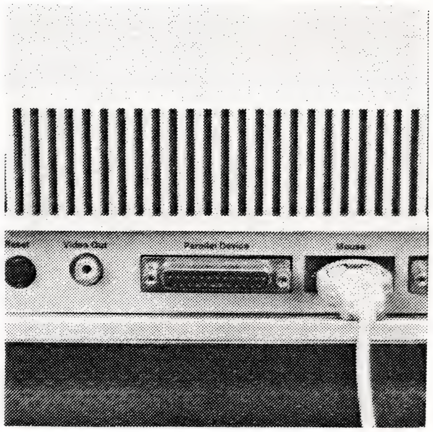
Lisa is equipped with built-in connectors for attaching extra devices: printers, additional disk drives, modems, and any other equipment that interacts with Lisa.



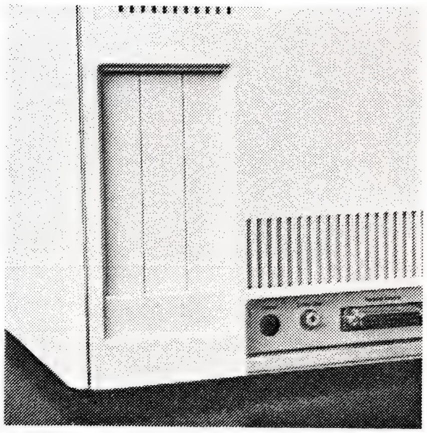
Serial Connectors: Lisa's two serial connectors accept 25-prong "D" plugs for devices that use serial signals. If you do not know whether a device you want to attach is serial or parallel, see the manual that came with the device.



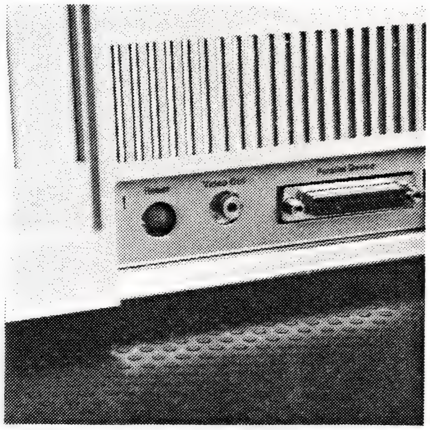
<ins>Parallel Connector</ins>: Lisa's parallel connector accepts 25-prong "D" plugs for parallel devices. If you have more than one parallel device, you can add additional parallel connectors through the expansion slots on Lisa's back panel.



<ins>Expansion Slots</ins>: Lisa's three expansion slots accommodate expansion cards for a variety of general and special functions. Special instructions for installing expansion cards come with all Apple-supplied cards. The general procedure is explained in Section E, Service.

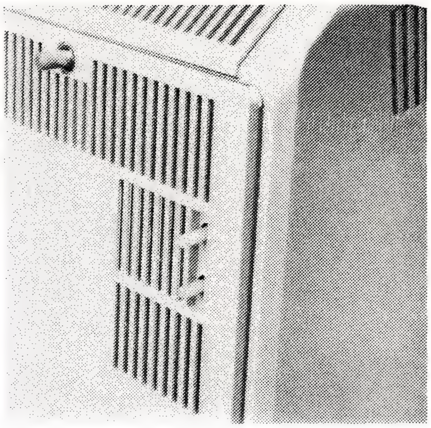


<ins>Video Out</ins>: Lisa's video out connector accepts standard video jacks. You can use it to send the screen display to an external video monitor.



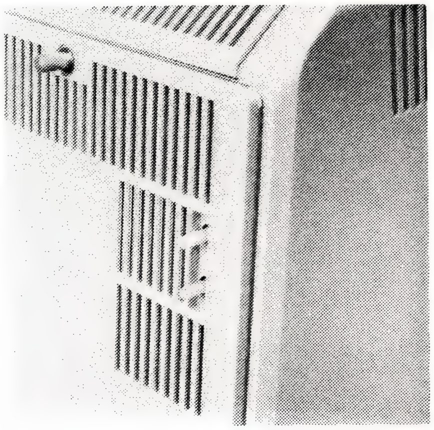
## Screen Controls

You can make three kinds of adjustments to the screen: brightness, contrast, and focus. The exact setting of each depends on lighting conditions, the age of the video tube, and your personal preference.



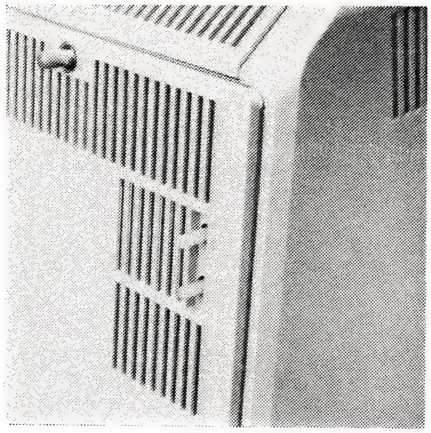
Brightness: The brightness control is the higher of the two white knobs extending from the upper-right corner of Lisa's back panel.

To set the brightness, first set a significant portion of the screen to black. Turn the brightness control all the way down, and then turn it up just until the black turns to gray. Finally, turn it back down just until the screen is black again and there is a clean line between black and gray areas. This operating point will change as the screen ages, so you may have to adjust it from time to time. Always set the brightness before adjusting the contrast.

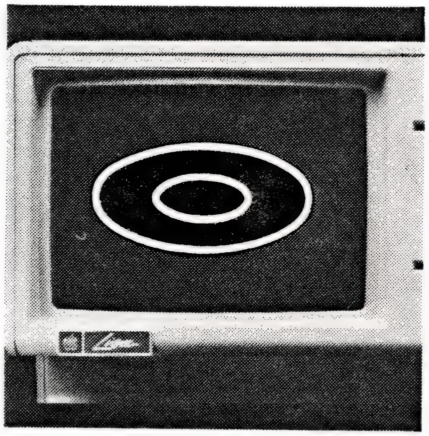


Contrast: The screen contrast is controlled through Lisa itself. Instructions for setting the contrast appear in Section E, Desktop Manager Reference Guide, under Set Brightness and Contrast, in the manual that came with any Lisa tool, and in the System Manager section of the Lisa Development System manual.

Focus: The focus control is the lower of the two white knobs extending from the upper-right corner of Lisa's back panel.



To set the focus, first fill the screen with text or graphics. Adjust the focus while looking at the display in the doughnut-shaped area around the center of the screen.



## RADIO AND TELEVISION INTERFERENCE

Lisa generates and uses radio frequency energy. If Lisa is not used in strict accordance with the instructions in this manual, it may interfere with radio or television reception. See Appendix 5, Hardware Specifications, for suggestions on how to eliminate interference should it occur.

C

Maintenance

# Section C

# Maintenance

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Maintenance C1

Clean Glare Filter C2

Clean or Replace Mouse Bearing C8

Clean Housing C12

Clean Spill Shield C13

# MAINTENANCE

Lisa requires almost no day-to-day maintenance. Most of the procedures recommended in this section, such as cleaning the glare filter, are for your comfort and convenience.

It's a good idea to review the maintenance schedule soon after you set up your system so that you will know which parts of Lisa you can clean. Later, when you have spilled something on the housing or you think the mouse may be dirty, look up the procedures in this section.

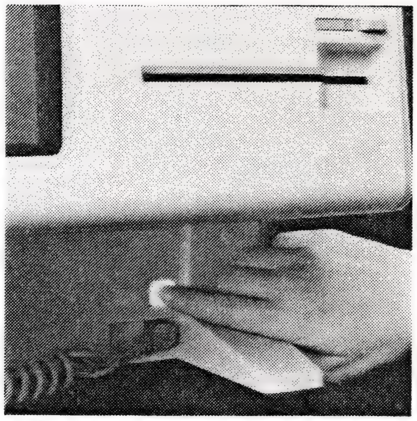
Suggested Maintenance

| What | When | Why | Page |
|---|---|---|---|
| Clean glare filter | As needed | Screen dusty | C2 |
| Clean or replace mouse bearing | 400 to 700 hours of use | Mouse response unreliable; bearing sticky or dusty | C8 |
| Clean housing | As needed | Housing dirty | C12 |
| Clean spill shield (under keyboard) | As needed | Something spilled on keyboard | C13 |

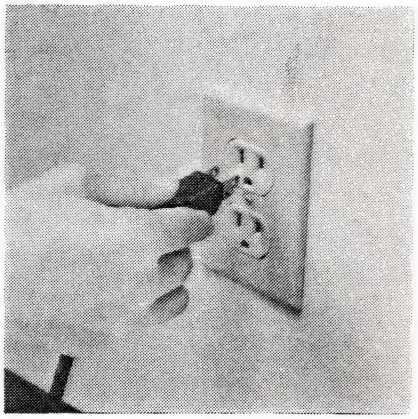
## CLEAN GLARE FILTER

Whenever Lisa's video display is on, the screen has a slight static charge, which acts as a dust magnet. The accumulated dust will eventually make the display hard to read. You can keep the screen fairly dust free by wiping it gently every few weeks with the specially treated cloth that came with your Lisa. If dust has worked its way under the glare filter, use the following procedure to clean the glass and filter.

1. Turn off Lisa by pressing the on-off button. Wait until all diskettes are released and the power light is off.



2. Unplug Lisa from the wall outlet.

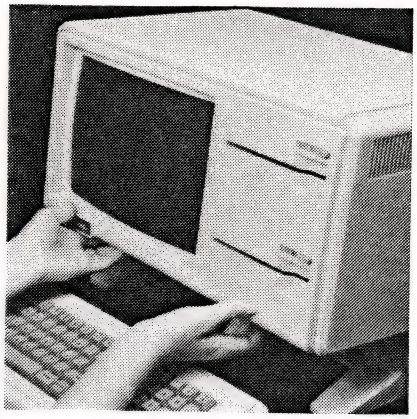


3. Remove the front panel, following this procedure:

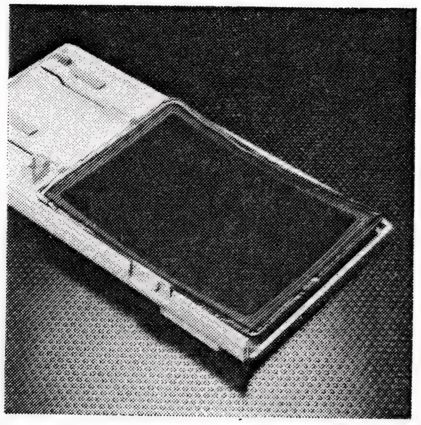
   a. Place one finger on each of the two dished finger pads beneath the front panel.

   b. Push the pads up to unlatch the panel.

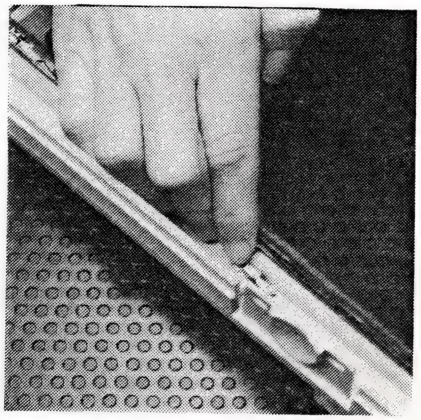
   c. Pull the panel forward and down.



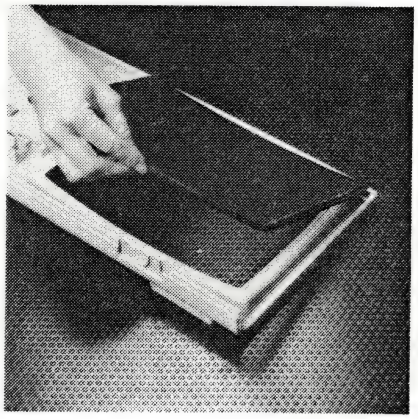
4. Set the panel on a flat surface, face down.



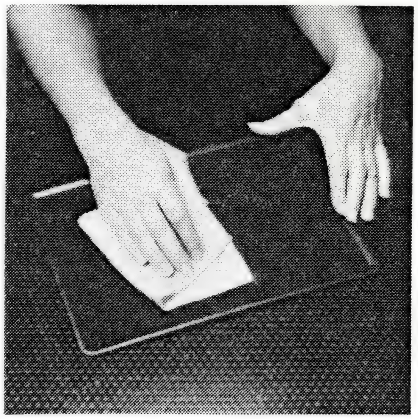
5. Push the frame of the glare filter out from under the metal clip at the bottom center of the frame.



6. Grasp the frame by the lower edge and lift the lower edge up until the top edge pops out from beneath the upper clip.

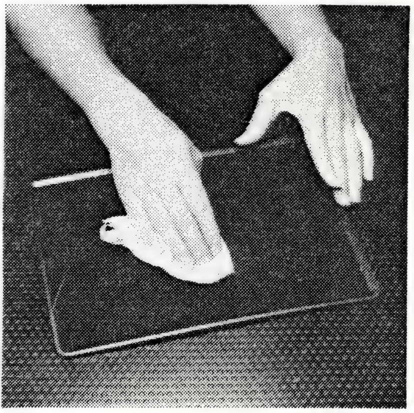


7. Wipe both the front and the back of the glare filter with the treated cloth that came with your Lisa.

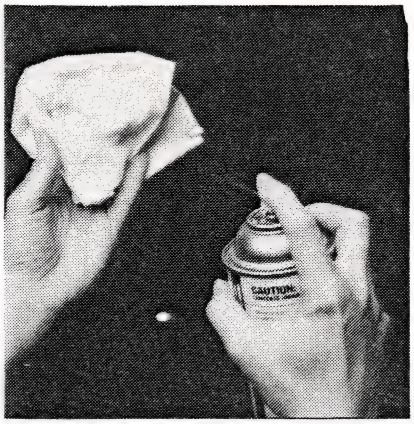


8. Shake out the cleaning cloth to remove the dust. Do not wash the cloth.

9. If the glare filter has spots from liquid spills, clean it in warm, soapy water. The filter can be torn, so treat it gently. Dry it with a towel before installing it over the video screen. (Do not use the treated cleaning cloth to dry the filter.)

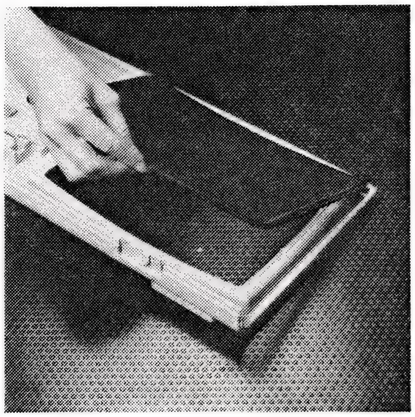


10. Clean the glass on the video screen with any glass cleaner and a soft cloth (not the specially treated cleaning cloth). Do not spray any liquid directly onto the glass, because stray drops could get into other parts of Lisa. Instead spray the cleaner onto the cloth, and then wipe the glass.

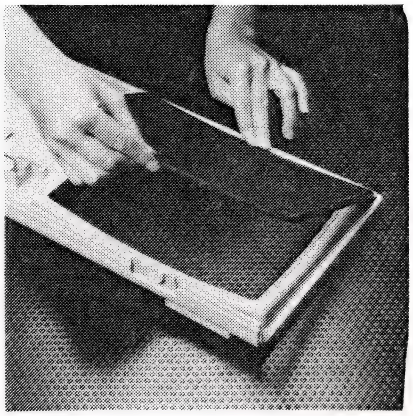


11. Replace the glare filter, following this procedure:

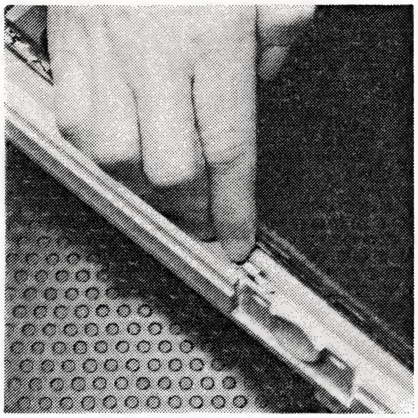
    a. Hold the glare filter against the clip along the upper edge of the front panel, at a 45 degree angle.



    b. While pressing down on the frame at the upper clip, rotate the lower edge until the frame slides under the upper clip.

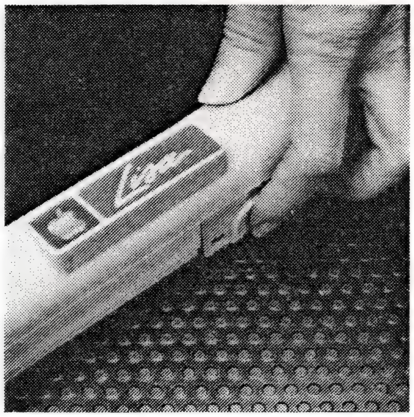


c. Push the lower edge of the frame in until it clears the lower clip, and then let it slide into place behind the clip.

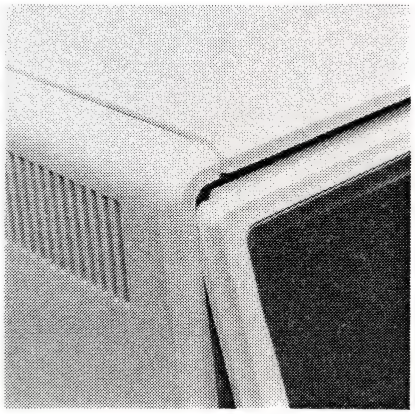


12. Replace the front panel, following this procedure:

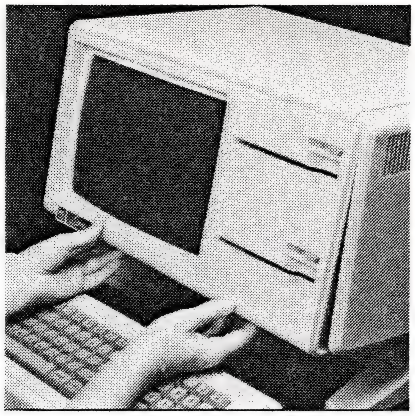
a. Hold the panel with one finger on each dished pad along the bottom edge.



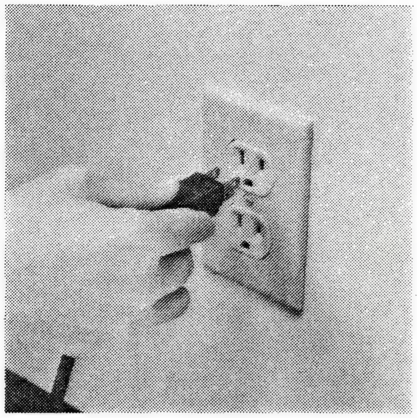
b. Insert the upper edge of the panel behind the lip of the top housing on Lisa.



c. Pressing the dished pads up, push the bottom edge of the panel against Lisa until the panel clicks into place.



13. Plug in the power cord.

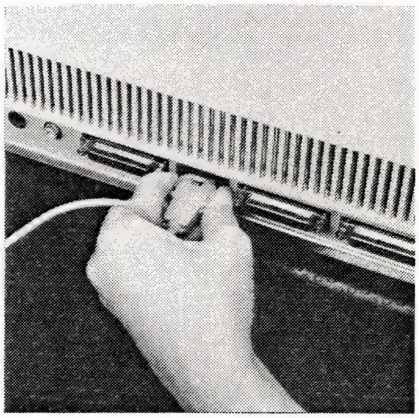


## CLEAN OR REPLACE MOUSE BEARING

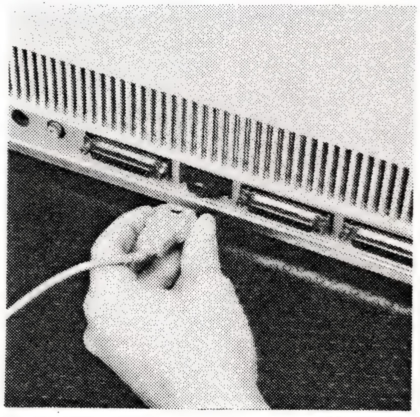
If the mouse bearing runs over a sticky spill, or if it is in an environment with a lot of dust or eraser crumbs, dirt may accumulate inside the mouse and make it unreliable. A simple cleaning of the bearing will eliminate the problem.

Also, after 400 to 700 hours of use, the surface of the bearing begins to wear down, making pointer control uneven. An inspection will tell you whether you need to clean or replace the bearing.

1. Detach the mouse cord from Lisa, following this procedure:
   a. With one finger on either side of the plug, push in on the soft plastic surrounding the connector.



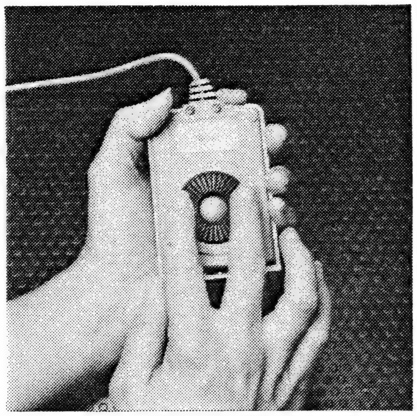
   b. Pull the cord free from Lisa.



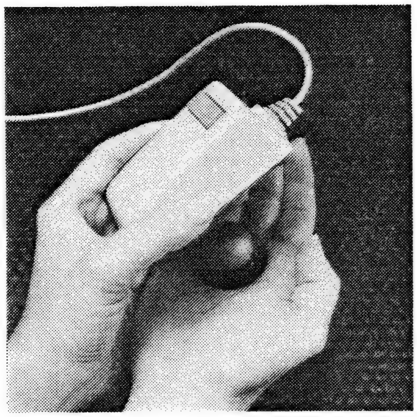
2. Open up the mouse, following this procedure:

   a. Turn the mouse over, exposing the black plastic ring around the bearing.

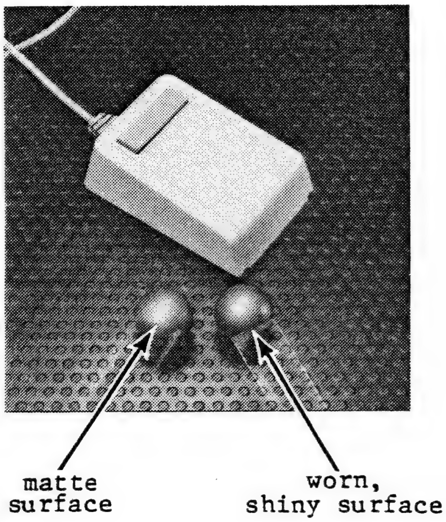
   b. Turn the ring counterclockwise 45 degrees, until the notch is lined up with the "O" (for open) on the mouse case.



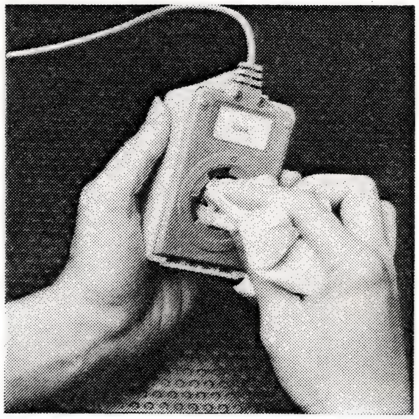
3. Turn the mouse over and let the ring and bearing fall into your hand.



4. Inspect the bearing. The surface should have a matte finish; that is, it should not be smooth and shiny. If there are smooth parts on the surface, the mouse will roll unevenly, making pointer control uneven. If the bearing shows signs of wear, order a new bearing. It will not hurt the mouse or Lisa to use the old bearing until the new one arrives.



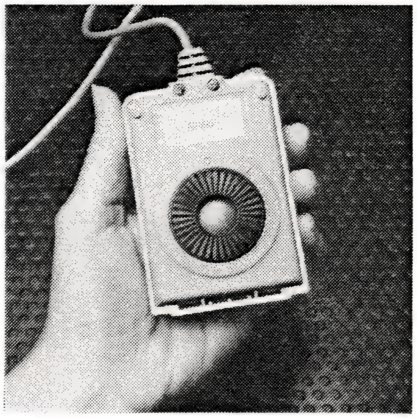
5. If the bearing is sticky, rinse it off and dry it thoroughly. Wipe the inside of the case with a clean, dry cloth.



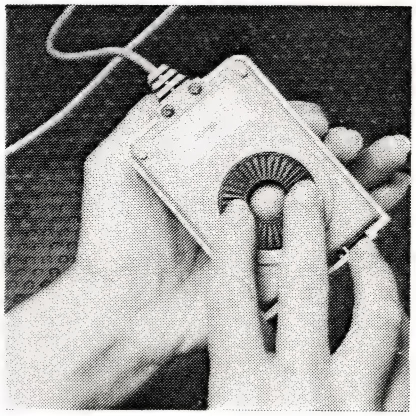
6. Reassemble the mouse, following this procedure:

   a. Drop the bearing gently into the hole.

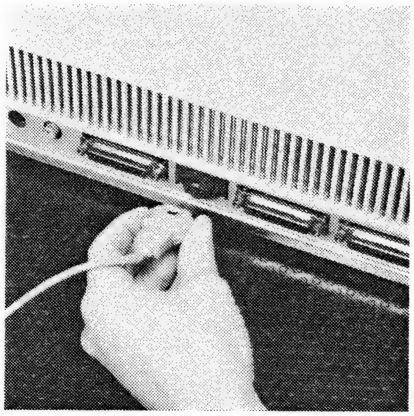
   b. Place the ring over the bearing, lining up the notch with the "O" on the case.



   c. Turn the ring clockwise 45 degrees, until the notch is lined up with the "L" (for locked) on the mouse case. You can feel the ring click into place.



7. Reattach the mouse cord to the back of Lisa.



## CLEAN HOUSING

The cabinet, keyboard, and mouse housing can be cleaned with most commercial cleaning solutions. However, don't use Pine-sol®, Lestoil®, or any other solvent containing <?>, because these solutions will damage the plastic.

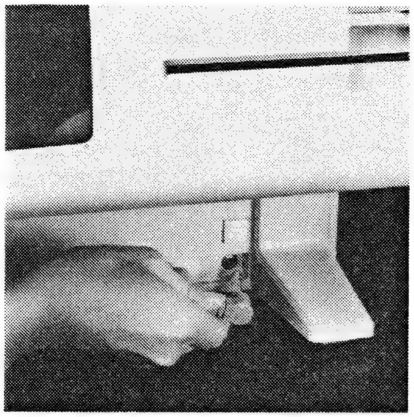
When you clean the housing, follow these safety procedures:

- Turn off and unplug Lisa before using any liquid on it.
- Don't spray anything into or near the air vents or the disk drive slots.
- Don't spray solvents on the keys.
- Don't try to clean anything inside the housing or the keyboard. You can clean the inside of the mouse, following the procedure discussed earlier in this section.

## CLEAN SPILL SHIELD

Underneath Lisa's keyboard is a plastic spill shield, which protects the electronic parts inside from moisture. This shield is designed to resist small spills; it is not intended to protect the keyboard from complete immersion or repeated dousings. If you spill a little water or black coffee on your keyboard, you probably have nothing to worry about. Just tilt the keyboard forward and let the liquid run out of the holes along the front edge. However, if you spill something sticky on the keys, you may want to rinse the residue off the spill shield, using the following procedure.

1. Unplug the keyboard from Lisa.



2. Hold the keyboard over a sink and spray lightly with distilled water. Let the water run out of the holes in the front of the keyboard.

3. Let the keyboard dry, and then plug it back into Lisa.

# D

# Troubleshooting

# Section D

# Troubleshooting

Use this troubleshooting guide when something seems to be wrong with Lisa. If you're simply having trouble making the system do what you want it to do, consult the manual for the application you are using.

This troubleshooting guide can be used in two ways:

- If you need help identifying which part of the system is causing the problem, start by answering the first question on page D3. Each possible answer directs you either to another question or to one of the diagnostic procedures on the following pages. Once you have identified the problem, refer to Section E, Service, for step-by-step instructions for replacing faulty parts.
- If you think you already know which component is at fault, skip the troubleshooting guide and go to the diagnostic procedure for that module, or run the Diagnostics diskette test on that module. Procedures for using the Diagnostics diskette appear in Procedure Z. The chart below lists the specific diagnostic procedures and their page numbers.

Every time you turn on the Lisa, it automatically tests enough of the system to verify that startup is possible. For a complete description of the startup tests, see Appendix 3, Automatic Startup Tests.

This troubleshooting guide covers only the most likely problems. If the procedures suggested here do not solve your problem, take the system to a service technician for more thorough testing.

| | | |
|---|---|---|
| Procedure A. | Power Problems | page D6 |
| Procedure B. | Specific Video Problems | page D8 |
| Procedure F. | System Hangs | page D9 |
| Procedure I. | Mouse | page D10 |
| Procedure J. | Keyboard | page D11 |
| Procedure T. | Startup Expansion Card Problems | page D12 |
| Procedure U. | Startup Diskette Problems | page D13 |
| Procedure V. | Startup ProFile Problems | page D15 |
| Procedure X. | Startup Symptoms and Error Messages | page D16 |
| Procedure Y. | Office System Error Messages | page D23 |
| Procedure Z. | Diagnostics Diskette | page D24 |

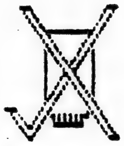
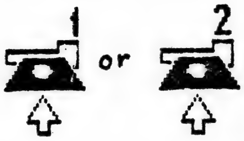
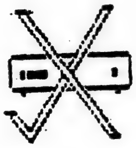
When did the problem arise?

| | |
|---|---|
| • While you were starting up Lisa. | Go to 1A, below |
| • While you were working on Lisa. | Go to 2A, below |
| • While you were turning off Lisa. | Go to 3A, below |

1A. Is the power light on?

| | |
|---|---|
| • Yes. | Go to 1B, below |
| • No. | Go to Procedure A, Power Problems |

1B. What is on your screen?

| | |
|---|---|
| • Nothing. | Go to Procedure X, Startup Symptoms and Error Messages |
|  | Go to Procedure T, Startup Expansion Card Problems |
|  | Go to Procedure U, Startup Diskette Problems |
|  | Go to Procedure V, Startup ProFile Problems |
| • Some other unexpected display. | Go to Procedure X, Startup Symptoms and Error Messages. |
| • Normal desktop display | Go to 2B, below |

2A. What is on the screen?

| | |
|---|---|
| • Nothing | Go to 3B, below |
| • An error message, such as <Sample Filer error message> | Go to Procedure Y, Office System Error Messages |
| • Unstable picture, lines on screen, or display at an angle. | Go to Procedure B, Specific Video Problems |
| • A random display. | Go to Procedure F, System Hangs |
| • Normal desktop display. | Go to 2B, below |

2B. How does the system respond to input from you?

| | |
|---|---|
| • It ignores everything: keyboard, mouse, start-up button, and disk eject buttons. | Go to Procedure F, System Hangs |
| • Responds correctly to everything except mouse. | Go to Procedure I, Mouse Problems |
| • Responds correctly to everything except keyboard. | Go to Procedure J, Keyboard Problems |
| • Responds correctly to everything except disk eject buttons. | Go to Precedure H, Disk & Disk Drive Problems |
| • Appears to respond, but gives an error message. | Go to Procedure G, Office System Error Messages. |

3A. What happened when you pressed the on-off button to turn the system off?

| | |
|---|---|
| • The system did not respond at all. | Go to Procedure F, System Hangs |
| • Power-down proceeded normally, but one or more of the diskettes was not released from the drive. | Go to Procedure H, Disk & Disk Drive Problems |
| • An error message appeared, such as <Tool or Filer error message, to come> | Go to Procedure Y, Office System Error Messages |

3B. Is the power light on?

| | |
|---|---|
| • No. | Go to Procedure A, Power Problems |
| • Yes. | Go to Procedure D, General Video Problems |

## PROCEDURE A. POWER PROBLEMS

- Check to make sure that all cables are firmly in place and that the system is plugged in. If the power cord is loose, insert it correctly and try again to start the system.

- Verify that both the front and back panels are installed securely. Each panel is equipped with a safety interlock which automatically turns off all power if the panel is not in place.

- Verify that the wall outlet is actually receiving electricity. Try plugging in a lamp and turning it on. If the lamp works, you know that the outlet is working.

- Verify that there are at least two inches of air space on all sides of the Lisa and that nothing is blocking the flow of air around the bottom edge of the cabinet.

A thermostat in the power supply shuts off the system automatically if the temperature surpasses about 90 degrees Centigrade (195 degrees Fahrenheit). If the system may have overheated, unplug the Lisa, remove any obstructions to air flow, and let the system cool down for an hour. Try again to turn it on after everything has cooled.

If this procedure reveals a temperature problem, rearrange your system setup to allow for adequate ventillation. If the problem persists, replace the power supply.

If the system set-up, the electrical supply, and the cables all check out, the most likely sources of the problem are:

- A bad power supply.
- A bad I/O board.
- A bad power switch.

The power suppply is more likely to be the cause, but the only way to verify the diagnosis is to try replacing the old power supply. If a new power supply doesn't solve the problem, try replacing the I/O board. If neither the power supply nor the I/O board is the problem, take the system to a qualified service center for repair.

## PROCEDURE B. SPECIFIC VIDEO PROBLEMS

The symptoms listed below all indicate specific problems, mostly with the video system. Except for replacing the CPU board, all of the repairs in this table must be done by a qualified service technician. Do not try servicing the video system yourself; it can be dangerous even when the Lisa is unplugged.

Table D1. Specific Video Problems

| If Your Screen Looks Like This | Follow This Procedure |
|---|---|
| <graphics to come> | Take the system to a qualified service specialist. |
| <graphic to come> | Replace the CPU board. |

## PROCEDURE F. SYSTEM HANGS

Sometimes, usually because of software failures, Lisa ignores all input. The usual solution is to turn off the system and start over. Since Lisa's on-off button is channeled through the computer, however, turning the system off is not always possible.

The reset button, marked <!> on the back of the Lisa, is the backup technique for bringing the system back up when the software fails. Pushing the reset button clears the computer's memory and reinitiates the system startup procedures. Anything on the desktop that has not been put away is lost during a reset.

Before you push the reset button, make sure you have made every effort to save any work that was on the desktop:

- If the mouse is not working, try the alternative keyboard commands for putting away active documents. (See the manual for the software you are using.)
- Try pressing the disk-release buttons, which should cause Lisa to save all documents and realease the diskettes.
- Try turning the system off by pressing the on-off button once, which should trigger a series of verification and storage procedures.

If the system does not respond to any of these techniqes, you will not be able to recover whatever you were working on when the system failed.

Press the reset button once.

- If the system starts up normally, you probably do not have a hardware problem. See Section E, Desktop Manager Reference Guide, under Repair a Disk After a System Crash, in any tool manual.
- If Lisa displays an error message or error tones, refer to Procedure X, Startup Symptoms and Error Messages.
- If Lisa still "hangs," that is, if it still doesn't respond after you pressed the reset button, unplug the system from the wall outlet. Turn it back on, and listen carefully for error tones. See Procedure X, Startup Symptoms and Error Messages.

## PROCEDURE I. MOUSE PROBLEMS

Mouse problems fall into two categories:

- Sluggish response. If the screen pointer responds sporadically or unevenly to mouse movement, the ball inside the mouse is probably dusty. Clean the mouse, following the instructions in Section C, Maintenance. While you have the mouse open, check to see if the ball is worn. If cleaning the mouse doesn't solve the problem, try replacing the ball.

  If the ball is neither dusty nor worn, and response is still sluggish, you might be trying to use the mouse on a surface that is too uneven. If your desk or table has a particularly uneven surface finish, you can put a clipboard or other flat object under the mouse.

- No response. If the pointer doesn't seem to move in either or both directions, or if the mouse button doesn't seem to work, there is probably a mechanical problem. First, make sure that the mouse cable is plugged securely into the back of the cabinet. Then run the mouse test, following the instructions in Procedure Z, Diagnostics Diskette.

## PROCEDURE J. KEYBOARD PROBLEMS

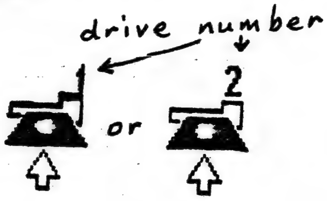
- First, verify that the keyboard is plugged securely into the cabinet. Pull out the plug entirely and replace it; don't just jiggle it in the socket.
- If that does not solve the problem, the next step is to run the keyboard diagnostic routine, following the instructions in Procedure Z, Diagnostics Diskette.

## PROCEDURE T. STARTUP EXPANSION CARD PROBLEMS

<<not yet implemented>>

## PROCEDURE U. STARTUP DISKETTE PROBLEMS

The presence of this icon on your screen means that Lisa is looking unsuccessfully for a startup diskette in the specified floppy disk drive.



If you ordinarily use a hard disk as your startup drive, this message may appear if Lisa has forgotten your Preference specifications. To use your normal startup drive, click Startup from; when the Startup menu appears, choose your normal startup drive.

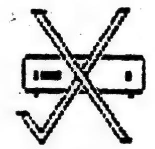
If you ordinarily use one of the floppy disk drives as your startup device, follow the procedures below for identifying the problem.

- Check that the disk drive shown in the icon is the same as the disk drive that holds your startup diskette.
- Check that there really is a diskette in the startup drive, and that it is a startup diskette (a Lisa Office System diskette or a Lisa Development System diskette, for example). Verify that the diskette is fully inserted, with the label on the right side facing up, and the notched corner on the right. After inspecting and reinserting the diskette, click Continue.
- If the same message appears, try restarting Lisa with a different startup drive:
  1. Move the startup diskette into the other floppy disk drive.
  2. Click Startup from.
  3. When the Startup menu appears, choose the floppy disk drive that now holds your diskette.
- If Lisa starts successfully from the other disk drive, run the diagnostic on your usual startup drive, following the instructions in Procedure Z, Diagnostics Diskette. To test a disk drive, Lisa needs a blank or obsolete formatted diskette.

- If Lisa displays the same message for the second drive, your startup diskette may be damaged. Try starting the system with the Diagnostics diskette in the startup drive, following the instructions in Procedure Z, Diagnostics Diskette. If Lisa starts, run a complete system check. If no problems are uncovered, the problem is probably with your startup disk.

## PROCEDURE V. STARTUP PROFILE PROBLEMS

The presence of this icon on your screen means that Lisa is looking unsuccessfully for the startup instructions on a ProFile hard disk attached to the parallel connector.



If you ordinarily use some other drive as your startup device, your Preferences have changed for some reason. To use your normal startup drive, click Startup from; when the Startup menu appears, choose your normal startup device..

If you ordinarily use a ProFile attached to the parallel connector as your startup drive, Lisa is having trouble reading the disk.

- First, verify that your ProFile is attached. DO NOT ATTACH OR DETACH A PROFILE WHILE EITHER LISA OR THE PROFILE IS ON. If the ProFile is not attached, follow this procedure for attaching it:

  1 Turn off the ProFile.

  2 Turn off Lisa.

  3 Attach the ProFile.

  4 Turn on Lisa.

  5 Turn on the ProFile.

- If the drive is attached, then for some reason Lisa can't read the startup instructions. Run the diagnostic test on the ProFile, following the instructions in Procedure Z, Diagnostics Diskette.

## PROCEDURE X. STARTUP SYMPTOMS AND ERROR MESSAGES

Every time you turn on Lisa, the system automatically runs a series of internal tests. These tests fall into two categories:

- The "kernel tests," which are designed to catch problems serious enough to interfere with the rest of the sequence.
- The module tests, which result in specific error messages.

Errors detected during the tests can result in screen messages, error tones, or both. If you do not remember whether or not Lisa sounded any error tones during startup, press the reset button once to repeat the startup tests.

Table D2 lists the possible results of failures during the kernal tests, and the likely causes. Table D3 lists the error tones generated by various startup tests, and Table D4 lists the specific error messages generated by the startup tests.

Some of the error messages indicate specific problems with Lisa; others indicate a problem with the system setup. In general, the presence of an icon with or without a numeric code means that the module represented by the icon should be replaced. For module replacement procedures, see Section E, Service.

For a complete description of all startup tests, see Appendix 3, Automatic Startup Tests.

In general, startup errors are best diagnosed by a qualified service technician.

Table D2. Kernel Test Failures

| Symptom | Possible Fix, in Order of Probability |
|---|---|
| Blank screen, no error tones | 1. Replace CPU board<br>2. Replace I/O board<br>3. Replace card cage |
| White screen with retrace line showing, no error tones | Replace CPU board |
| Random display, no error tones | Replace CPU board |
| Random display, one error tone | Replace CPU board |
| Random display, two low error tones | 1. Replace Memory board 1.<br>2. Replace CPU board<br>3. Replace card cage |
| Flashing screen and repeated error tone, alternating low and high pitch | 1. Replace I/O board<br>2. Replace CPU board<br>3. Replace card cage |
| Blank screen or random display, with error tones | Replace board acording to error tone sequence. (See Table D3, Startup Error Tones.) |

Table D3. Startup Error Tones

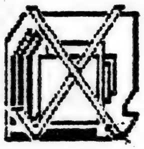
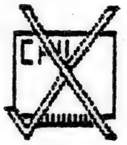
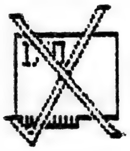
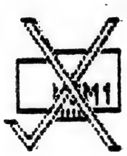
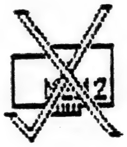
| Icon | Tones | Meaning |
|---|---|---|
| No icon displayed | Lo | CPU or memory error. Must be diagnosed by a qualified service technician. |
| No icon displayed | Lo,Lo | Memory failure in preliminary test. Replace one or both memory boards. |
| Card cage  | Lo,Hi | A problem somewhere in card cage. Run the complete Diagnostics check to identify which board is causing the problem. See Procedure Z, Diagnostics Diskette. |
| CPU board  | Lo,Lo,Hi | Replace CPU board. |
| I/O board  | Lo,Hi,Lo | Replace I/O board. |
| Memory board   | Lo,Hi,Hi | Replace specified memory board. |

Table D3. Startup Error Tones, continued

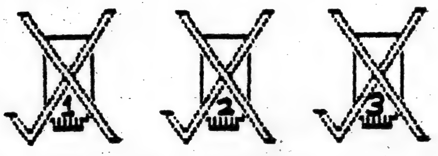
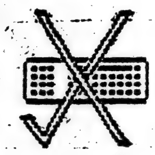
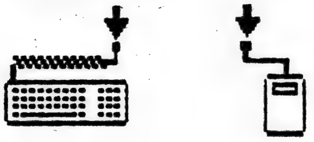
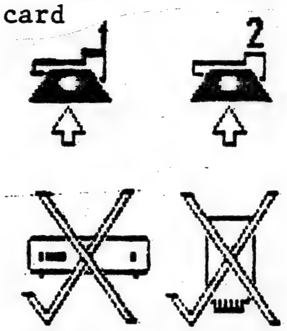
| Icon | Tones | Meaning |
|---|---|---|
| Expansion card<br> | Hi,Lo,Lo | Replace expansion card in specified slot. |
| Keyboard<br> | Hi,Lo,Hi | Replace keyboard. |
| Keyboard/ mouse disconnected<br> | Hi,Hi,Lo | Keyboard or mouse disconnected. Continue without keyboard or mouse, or attach keyboard or mouse. If both are attached, run keyboard or mouse Diagnostic. See Procedure Z, Diagnostics Diskette. |
| Disk drive, ProFile, or expansion card<br> | Hi,Hi,Hi | Startup failure. Insert startup disk, specify a different startup drive, or check startup drive. See Procedures T, U, and V. |

Table D4. Startup Error Messages

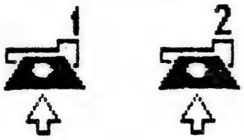
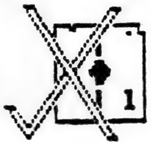
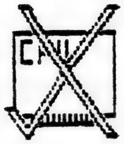
| Icon | Code | Meaning |
|---|---|---|
| Disk drives<br> | 7 | No diskette in startup drive. |
| Diskette<br> | 20 | Diskette write protected. |
| | 21 | Unable to verify diskette. |
| | 22 | Unable to clamp diskette. |
| | 23 | Unable to read diskette. |
| | 24 | Diskette write protected. |
| | 38 | No startup file on diskette. |
| | 39 | Disk controller timeout. |
| | 75 | Startup failure; startup file on diskette probably bad. |
| CPU board<br> | 40 | MMU error. |
| | 41 | CPU selection logic error. |
| | 42 | Video circuitry error. |
| | 43 | Parity circuitry error. |
| | 44 | Unexpected NMI interrupt. |
| | 45 | Bus error. |
| | 46 | Address error. |
| | 47 | Other unexpected exception. |
| | 48 | Illegal instruction error. |
| | 49 | Line 1010 or 1111 trap. |

Table D4. Startup Error Messages, continued

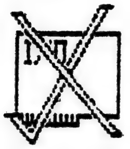
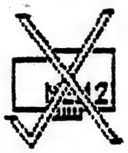
| Icon | Code | Meaning |
|---|---|---|
| I/O board<br> | 50 | COPS VIA error. |
| | 51 | Parallel port VIA error. |
| | 52 | I/O board COPS error. |
| | 53 | Keyboard COPS error. |
| | 54 | Clock error. |
| | 55 | RS232 port A error. |
| | 56 | RS232 port B error. |
| | 57 | Diskette controller error. |
| | 58 | I/O board access error. |
| | 59 | I/O board COPS code error. |
| | 60 | I/O or keyboard error. |
| Memory board<br> | 70 | Memory read/write error. |
| | 71 | Memory parity error. |
| ProFile<br> | 80 | ProFile not attached to parallel port. |
| | 81 | ProFile not ready. |
| | 82 | Bad response from ProFile. |
| | 83 | Nonzero status bytes returned from ProFile. |
| | 84 | Invalid boot file on ProFile. |
| | 85 | ProFile timeout. |

Table D4. Startup Error Messages, continued

| Icon | Code | Meaning |
|---|---|---|
| Expansion card<br> | 90 | No expansion card installed. |
| | 91 | Expansion card not bootable. |
| | 92 | Bad checksum on expansion card. |
| | 93 | Bad status returned from expansion card. |

## PROCEDURE Y. OFFICE SYSTEM ERROR MESSAGES

<<To come.>>

## PROCEDURE Z. DIAGNOSTICS DISKETTE

The Diagnostics diskette is designed to identify which Lisa component is causing a problem. If you think you already know which component may be at fault, follow the instructions below for running a test on that part. If the suspected component checks out, or if you do not know which component to test, run a complete system check.

A brief description of some of the options follows the instructions for using the diskette.

The diskette itself is stored on the inside back cover of this manual.

## Using the Diskette

The Diagnostics diskette follows the same conventions as the Lisa tools. You open menus by pointing to the menu title and holding down the mouse button; you choose menu items by releasing the mouse button when the item you want is highlighted.

To run the Diagnostics diskette

- ➤ If Lisa is turned on, turn it off by pressing the on-off button once.
- ➤ Insert the Diagnostics diskette in drive 1, if it is working. If drive 1 is not working, insert the diskette in drive 2.
- ➤ Turn Lisa on.
- ➤ When you hear the first click, and before you hear the double click, press the space bar, and then wait for the Startup menu to appear.
- ➤ Use the mouse to select the drive that holds the Diagnostics diskette. If the mouse isn't working, hold down the [COMMAND] key while pressing the number listed in the menu next to the drive.
- ➤ Choose either Run Full System Check (to test the entire system) or Check . . . (to test a specific component) from the Options menu.
- ➤ If you chose Check . . ., select the icon for the module you want tested.

➤ Click OK.

➤ Follow any instructions on the screen for testing the keyboard, mouse, or disk drives.

➤ If you want to terminate the tests, press the on-off butto once.

## Choosing Options

### Set Diagnostic Controls

This option allows you to specify whether Lisa runs each test once or indefinitely. If you do not set the controls, Lisa runs the tests only once.

Choose Set Diagnostic Controls and ask for repeated tests if the problem is intermittent. Then choose either Run Complete System Check or Check. Lisa continues running the tests until either a problem is found or you stop the tests by pressing the on-off button once.

### Run Complete System Check

This option tests all of the components inside Lisa, except the controller for the disk drive that holds the Diagnostics diskette.

If you choose this option, Lisa asks you to participate in some of the tests, such as the keyboard and mouse check.

For the test of the floppy disk drive controller, you need either a blank formatted diskette or any formatted diskette that can be written over. This test destroys any information that was stored on the diskette. If you do not have a diskette ready, stop the tests by pressing the on-off button once.

### Check

This option allows you to test only the component or components that you think may be at fault.

# E

## Service

# Section E

# Service

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# SERVICE

Lisa has been designed so that you can do most of the servicing yourself, by removing and replacing faulty parts and by installing your own expansion cards. This section is a step-by-step guide to making repairs, when you have identified a problem, and to installing new cards, when you want to expand Lisa.

If you are having trouble but don't know which component is at fault, consult Section D, Troubleshooting.

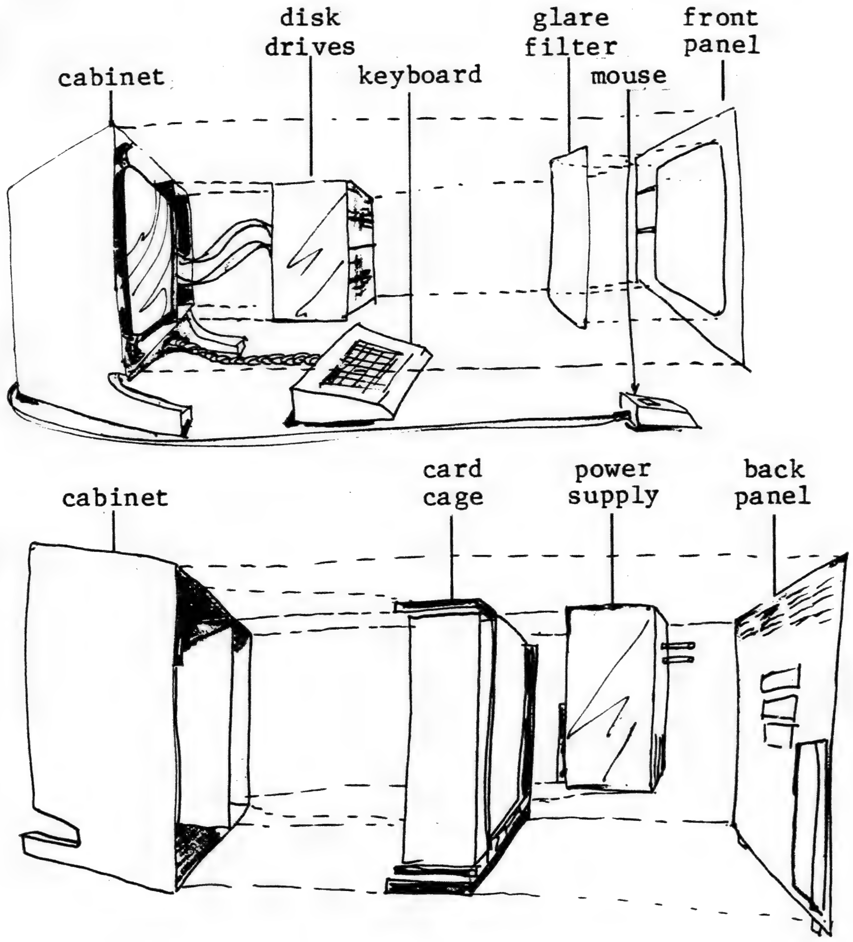
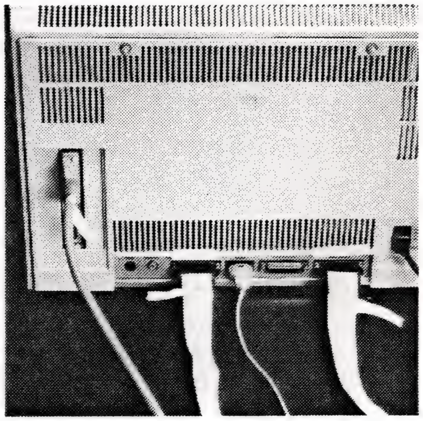


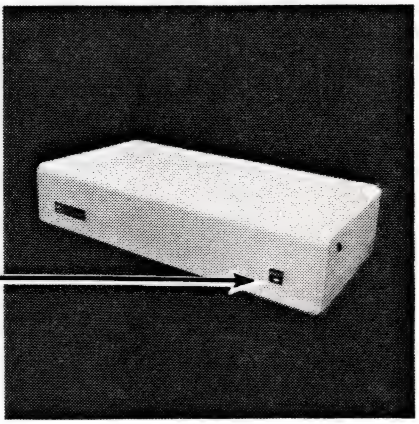
Figure 1. Lisa, Exploded View

Before you begin any servicing, make sure Lisa and any attached devices have been turned off and unplugged from the wall outlet. As a safety measure, Lisa automatically turns itself off as soon as you remove either the front or the back panel. But in order to protect your disks from damage, it's a good idea to turn Lisa off with the on-off button and to unplug it before removing either panel.

When removing the back panel for servicing, you will have to remove some or all of the cables connecting Lisa to peripheral devices. You may save yourself time and confusion later by labeling all connectors with tape when you remove the cables so that you can match the plugs and sockets later.



If you have a ProFile hard disk attached to Lisa, wait until the ready light on the disk has been steady for at least 45 seconds before turning off the ProFile.

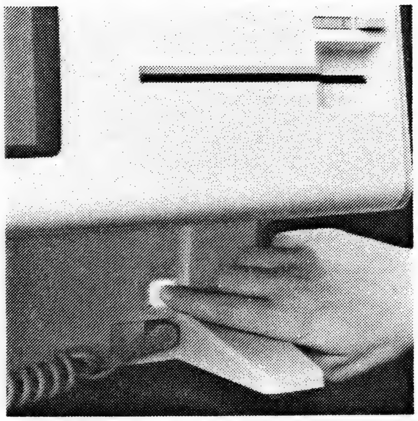


ready light

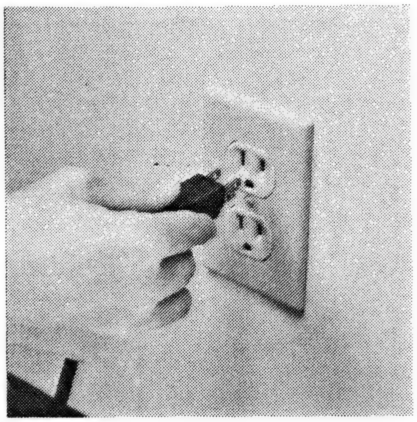
## DISK DRIVES

### Getting Inside

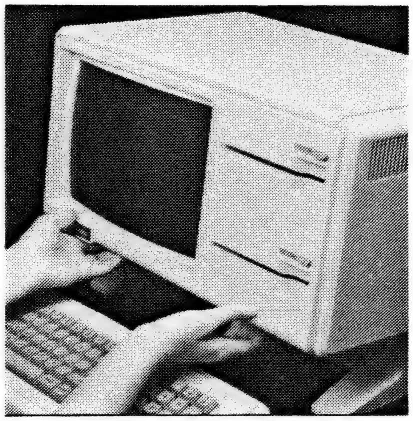
1. Turn off Lisa by pressing the on-off button. Wait until all diskettes are released and the power light is off.



2. Turn off all peripheral devices. Unplug Lisa and all peripherals from the wall outlet.



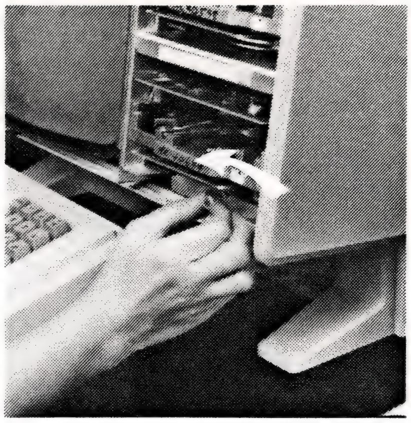
3. Remove the front panel, following this procedure:
   a. Place one finger on each of the two dished finger pads beneath the front panel.
   b. Push the pads up to unlatch the panel.
   c. Pull the panel forward and down.



## Removing Disk Drives

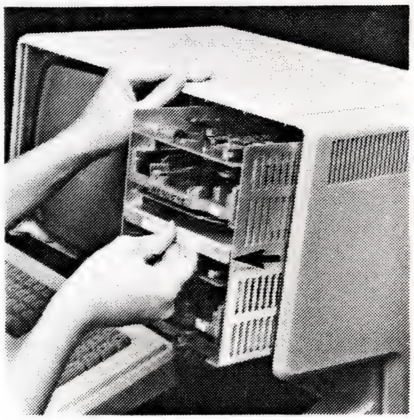
1. Loosen the thumbscrew at the base of the disk drives by turning counterclockwise.

   This screw loosens but does not come free from the module. When it's loose, you can feel the pressure of the spring at the base of the screw and the screw can be pulled slightly in and out.

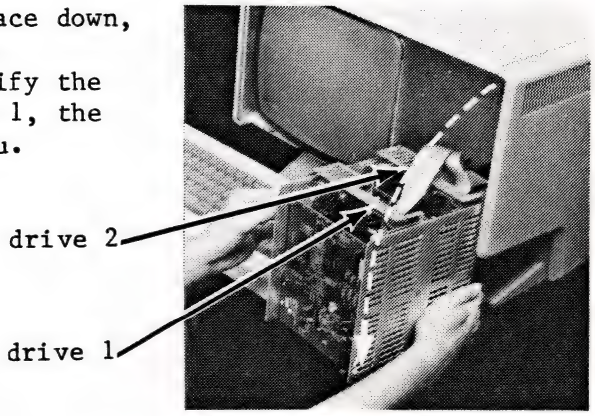


2. Grasp the metal tab between the two drives and slowly pull out the module.

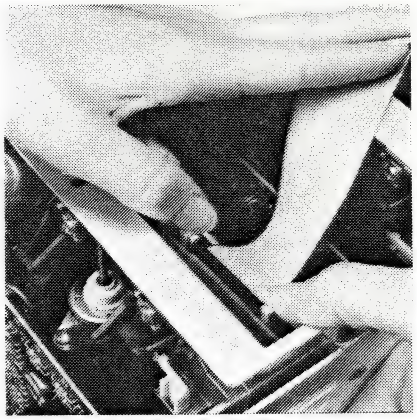
   Be careful not to put any strain on the cables connecting the disk drives to Lisa.



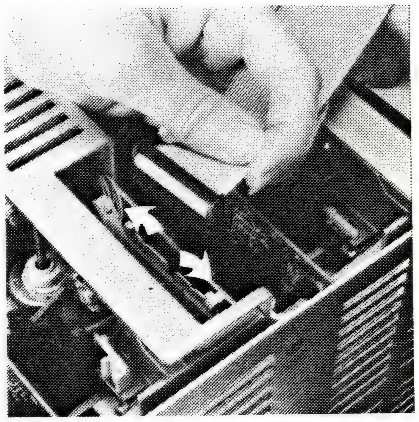
3. Place the module face down, exposing the cable connectors. Identify the connector in drive 1, the drive closer to you.



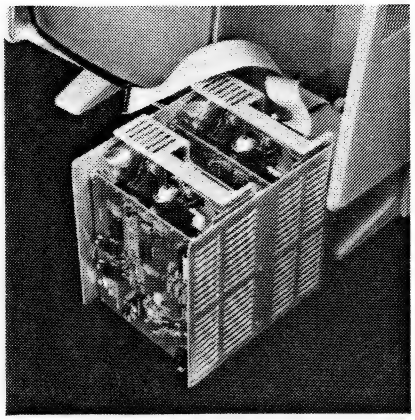
4. Place one thumb on each of the two gray tabs projecting from the cable connector.



5. Pull the tabs apart to release the cable. Remove the cable from the connector.



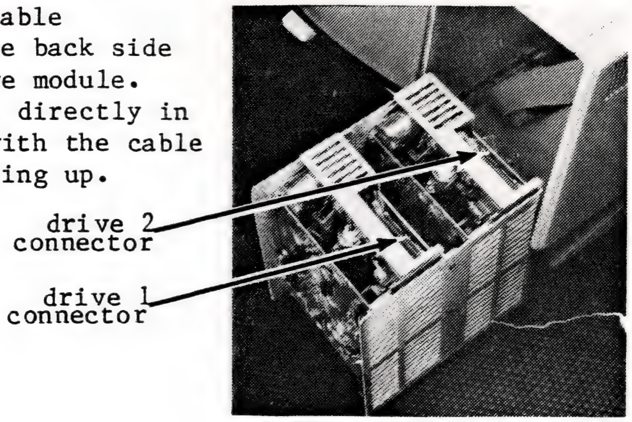
6. Repeat with the second cable connector, removing it from drive 2.



7. Set aside the old disk drive module and unpack the new one.

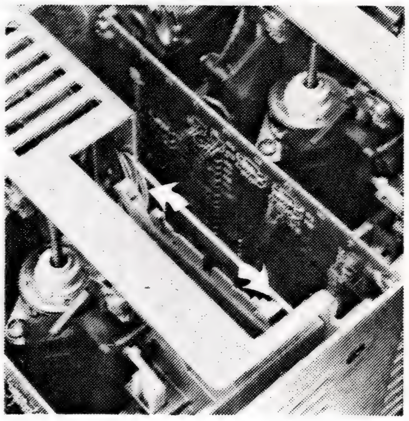
## Installing New Disk Drives

1. Locate the two cable connectors on the back side of the disk drive module. Place the module directly in front of Lisa, with the cable connectors pointing up.



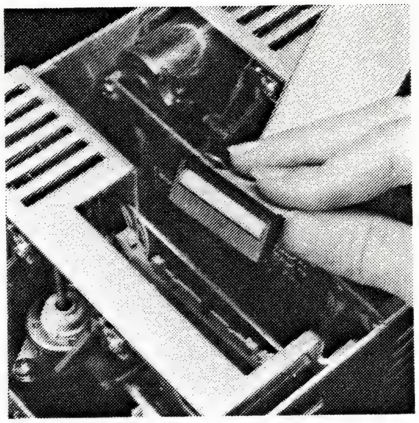
2. Make sure the ridged tabs on either side of the cable connectors are in an open position.

   If these tabs are upright, push them away from each other until they fall open.

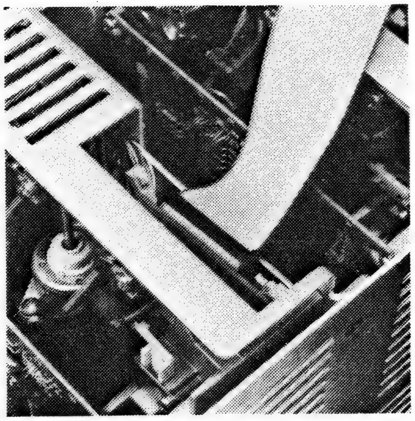


3. Locate the shorter of the two flat, gray cables inside Lisa. You will insert this cable into the connector on drive 2, the drive closer to Lisa.

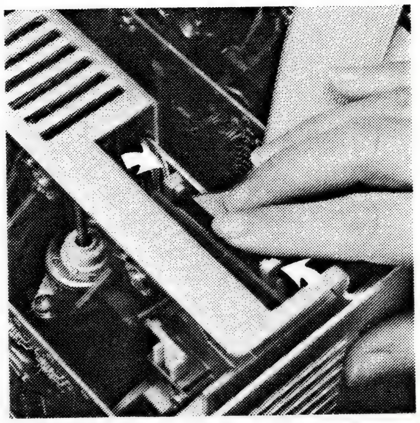
4. Hold the black plastic plug at the end of the cable, with the holes pointing down and the ribbon cable away from you.



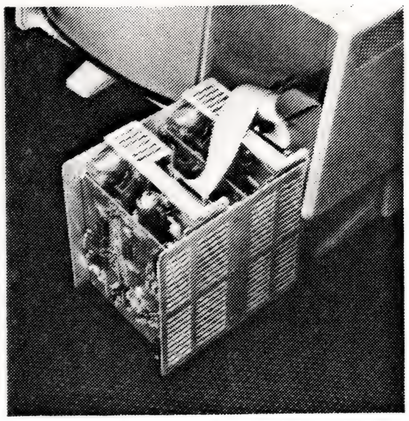
5. Place the plug gently into the gray connector, making sure it is centered and fitted neatly into the socket. Verify that all 20 prongs on the connector are aligned with the 20 holes in the plug.



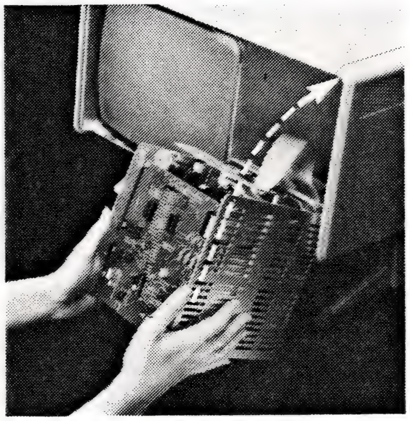
6. Press down firmly on the plug until the gray tabs on either side click into place.



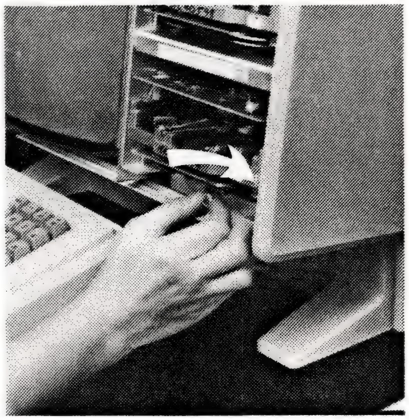
7. Repeat this procedure with the longer cable, inserting it into the connector for drive 1, the drive closer to you.



8. Pick up the disk drive module by the metal housing, tilt it back, and slide it into Lisa.



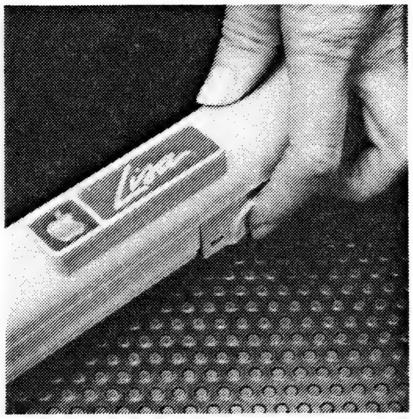
9. Secure the module by pushing in on the screw at the base of the drives and by turning the screw clockwise until it is snug.



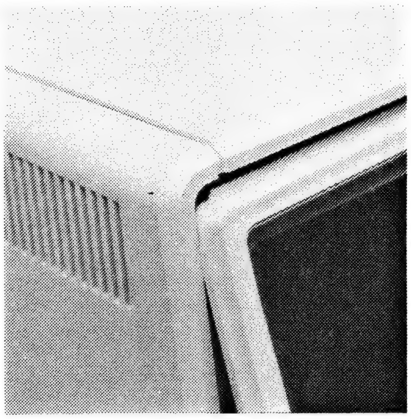
## Finishing Up

1. Replace the front panel, following this procedure:

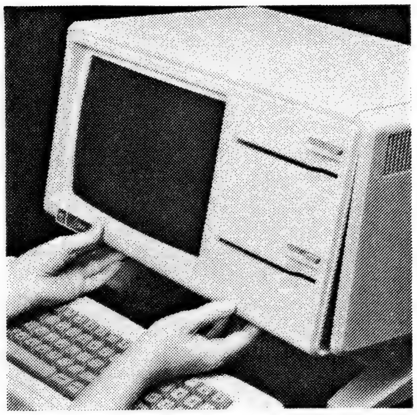
   a. Hold the panel with one finger on each dished pad along the bottom edge.



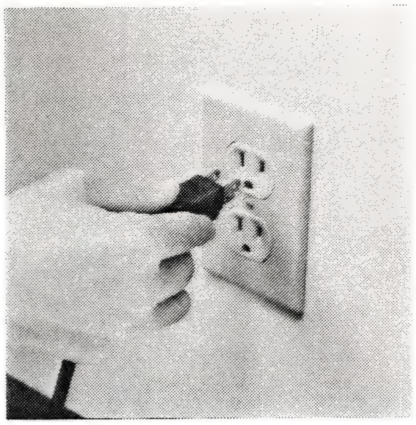
   b. Insert the upper edge of the panel behind the lip of the top housing on Lisa.



   c. Pressing the dished pads up, push the bottom edge of the panel against Lisa until the panel clicks into place.



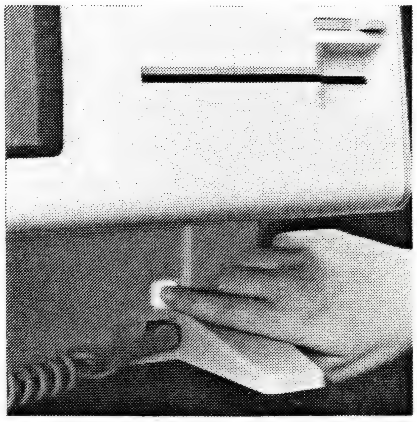
2. Plug in the power cord.



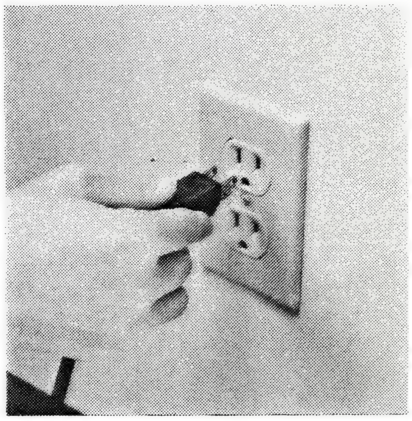
## I/O, CPU, AND MEMORY BOARDS

### Getting Inside

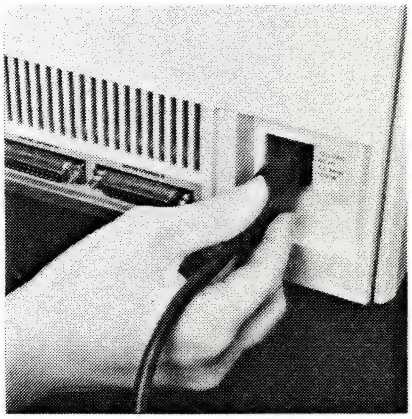
1. Turn off Lisa by pressing the on-off button. Wait until all diskettes are released and the power light is off.



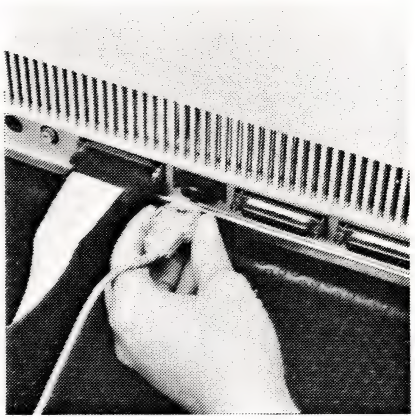
2. Turn off all peripheral devices. Unplug Lisa and all peripherals from the wall outlet.



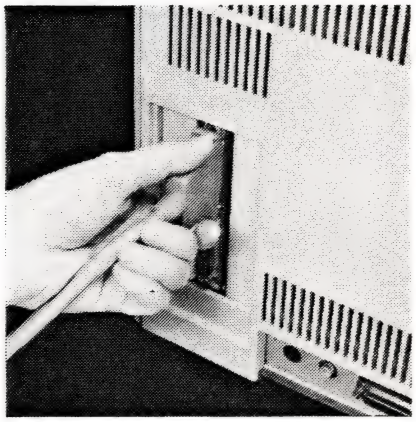
3. Disconnect the power cord from the back of Lisa. Turn Lisa so that the back panel is facing you.



If they are in the way, remove any cables that are attached to the connectors along the bottom edge of the back panel.



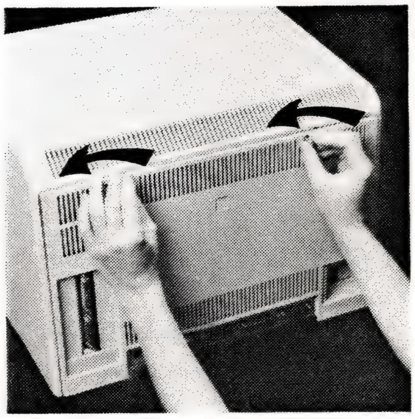
4. Remove any cables extending from the expansion cards on the left side of the back panel.



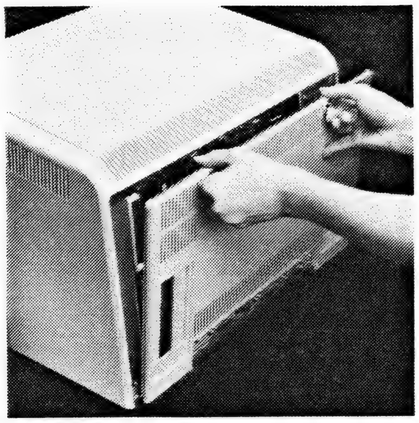
5. Remove the back panel, following this procedure:

   a. Turn the two thumbscrews along the upper edge counterclockwise until they won't turn any further.

      These screws loosen but do not come free from the back panel.



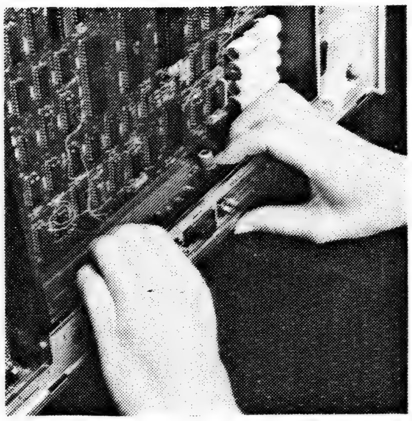
b. Pull the panel up and toward you.



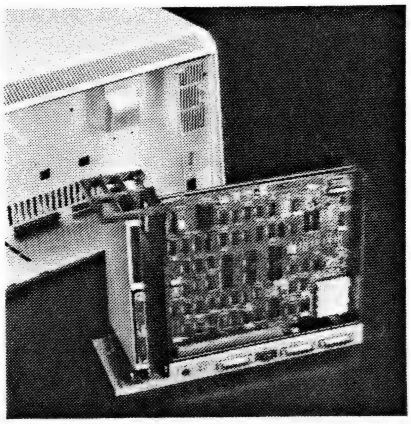
6. Remove the card cage by pulling the bar that runs just above the row of connectors along the bottom of the cage.

   Be careful not to put any pressure on the small components just behind the bar.

   You may have to brace your thumbs against the lower edge of Lisa and pull hard on the bar to free the card cage from the interior connectors.



7. Pull the cage out and set it on the table.



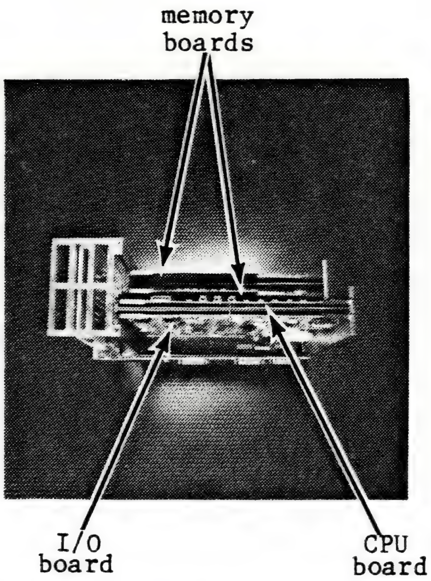
## Removing Boards

1. Identify the board to be removed.

   The CPU board has a brown lever on the right and a blue lever on the left.

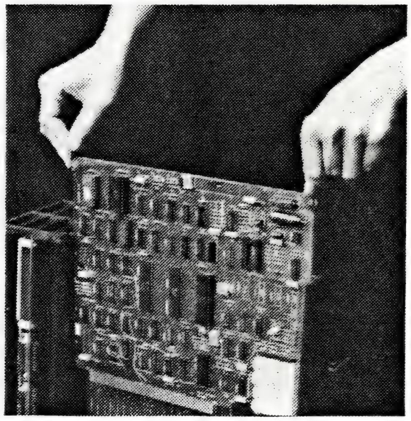
   The I/O board has a brown lever on the right and a red lever on the left.

   The memory boards have brown levers on the right and yellow levers on the left.

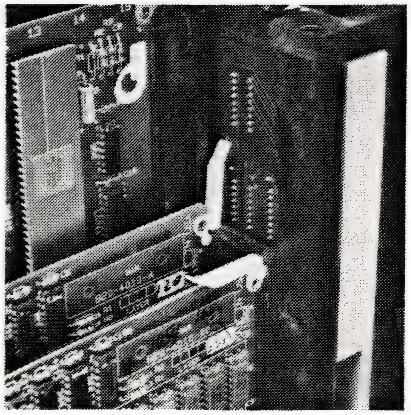


2. Place one thumb on either lever and simultaneously flip up the colored locking levers at the top of the board, and then pull the board up and out of its slot.

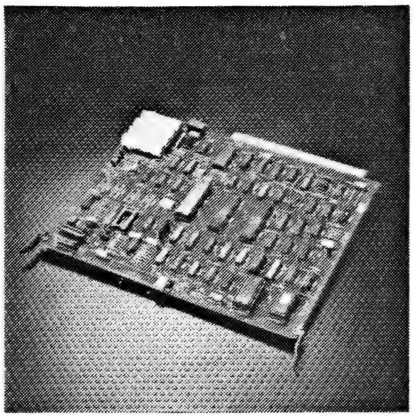
   Handle the board by the levers and plastic edges only.



If you are servicing a memory board and there is an expansion card in slot 3, be careful not to scrape the left-hand lever against the expansion card. If you have trouble handling the levers in the tight space, remove the expansion card before servicing the memory boards.



3. Place the board carefully on a flat surface, with the components facing up.

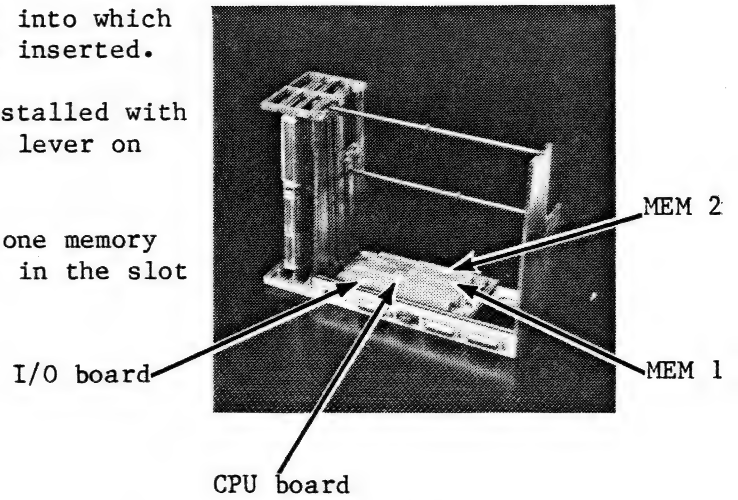


## Installing Boards

1. Identify the slot into which the board will be inserted.

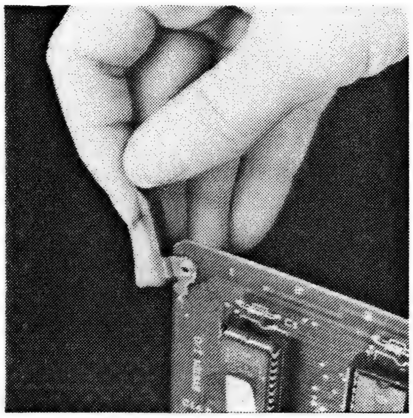
   All boards are installed with the brown locking lever on the right.

   If you have only one memory board, install it in the slot labeled MEM 1.

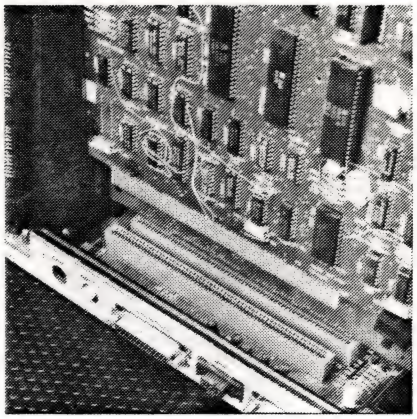


2. If the colored tabs on the board are not already in an up position, flip them up.

   Handle the board by the levers and plastic edges only.

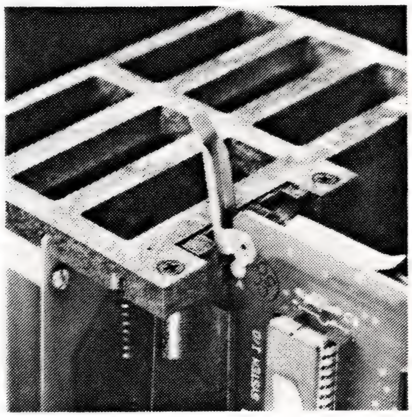


3. Holding the board by the levers, with the brown lever on the right, slide it into the thin grooves in the black plastic cage. Note that the slots in the bottom of the cage are staggered. This prevents you from inserting the board into the wrong slot.

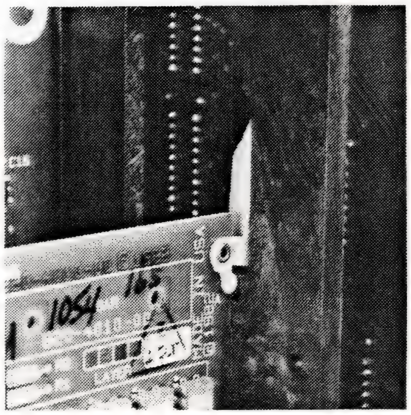


   You may have to center the bottom edge of the board in the slot. If so, touch only the plastic edge of the board. Do not touch the gold connector.

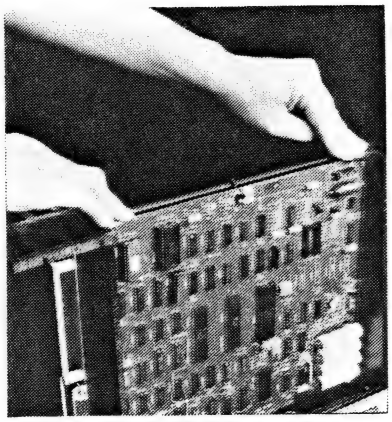
   The tabs on the CPU and I/O boards should be resting in the notches along the top of the cage.



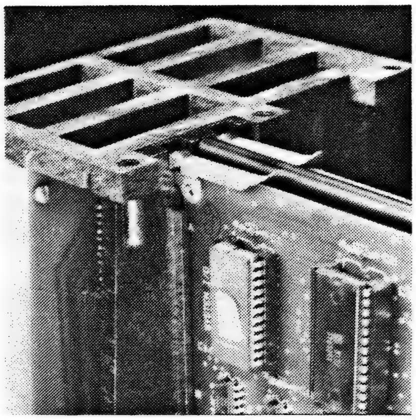
   The tabs on the memory boards should be resting on the black plastic frame.



4. Push down the levers simultaneously to lock the board into place.

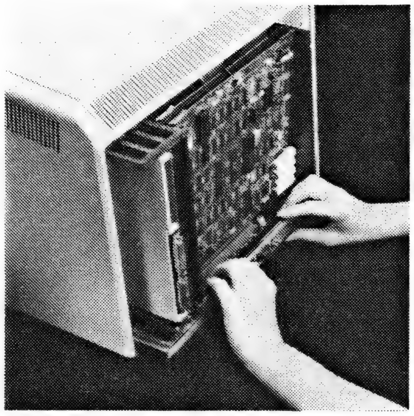


At this point, the rounded tabs below the levers should be set in the lower notches on the plastic card cage.

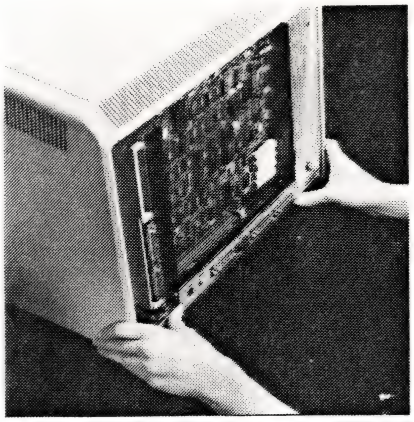


## Finishing Up

1. Holding the card cage by the black plastic rod, slide it back into Lisa.

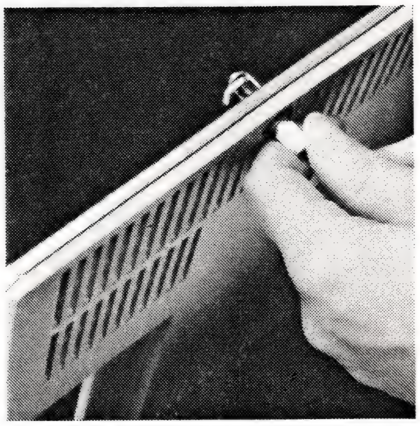


2. The cage will offer some resistance for the last 1/4-inch, while the card cage connectors slide into their slots inside Lisa. You may have to hold the frame with your fingers and press with your thumbs against the bottom of the cage. The cage is installed when the panel along the bottom is just inside of the bottom edge of Lisa.

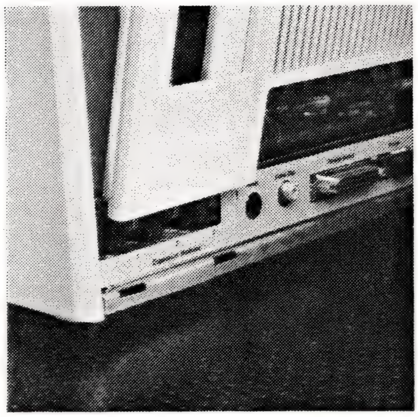


3. Replace the back panel, following this procedure:

   a. Make sure the metal prongs attached to the two screws are pointed to the left.

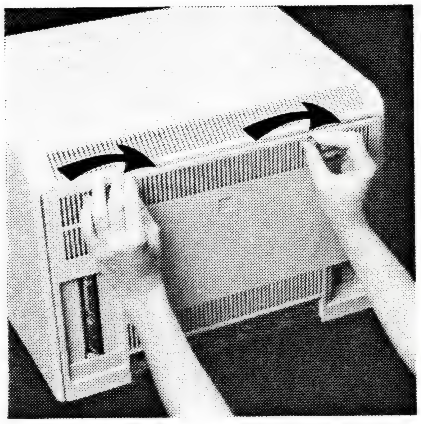


   b. Insert the tabs along the lower edge of the back panel into the slots at the base of Lisa.

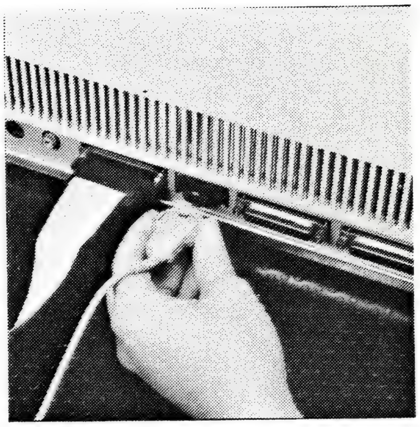


c. Push the panel flat against the back of Lisa. If you encounter resistance, check to make sure that the card cage is pushed as far into Lisa as it will go.

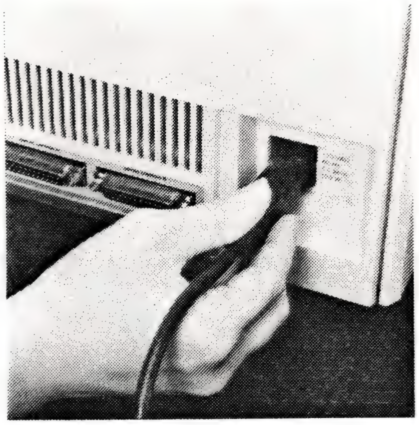
d. Turn the two thumbscrews clockwise until they are snug.

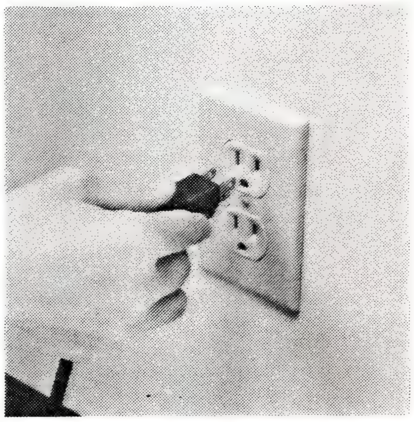


4. Reattach any cables that you removed from the expansion cards or from the bottom edge of the back panel.



5. Reconnect the power cord, plugging it first into the back of Lisa and then into the wall outlet.





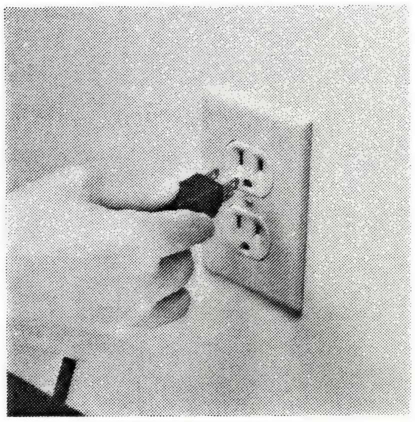
## CARD CAGE

Although most of Lisa's components are on the I/O, CPU, and memory boards, there are a few circuits on the bottom of the card cage. If the Diagnostics diskette could not identify whether a problem is with the cage or the boards, the recommended procedure is to replace the card cage, which comes with new boards installed.

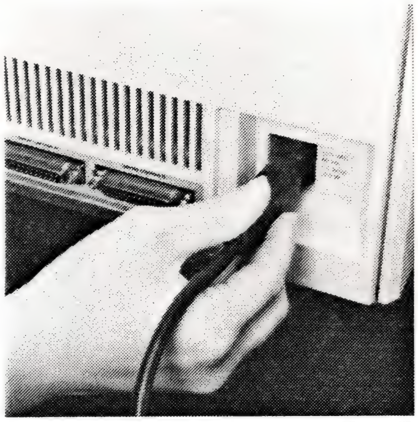
### Getting Inside

1. Turn off Lisa by pressing the on-off button. Wait until all diskettes are released and the power light is off.

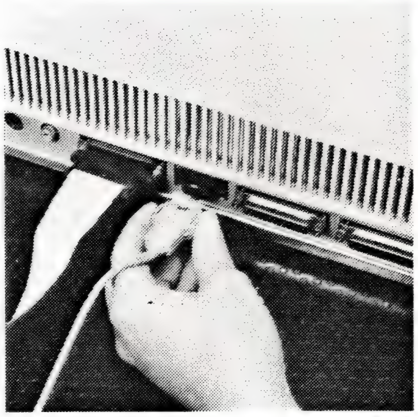
2. Turn off all peripheral devices. Unplug Lisa and all peripherals from the wall outlet.



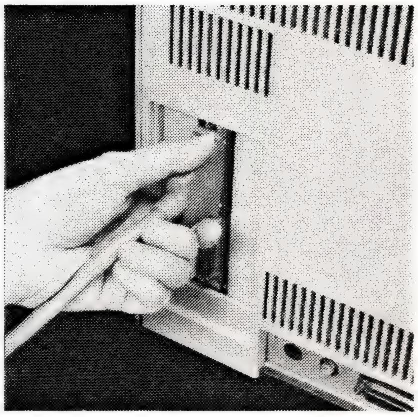
3. Disconnect the power cord from the back of Lisa.



4. Remove the cables that are attached to the connectors along the bottom edge of the back panel. Turn Lisa so that the back panel is facing you.



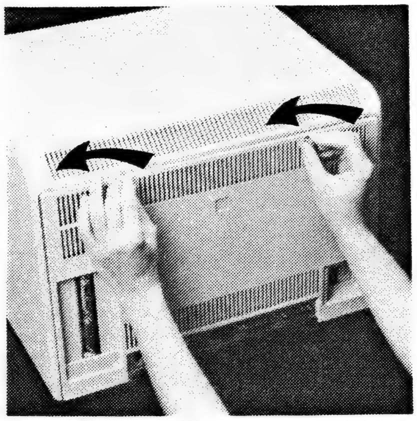
5. Remove any cables extending from the expansion cards on the left side of the back panel.



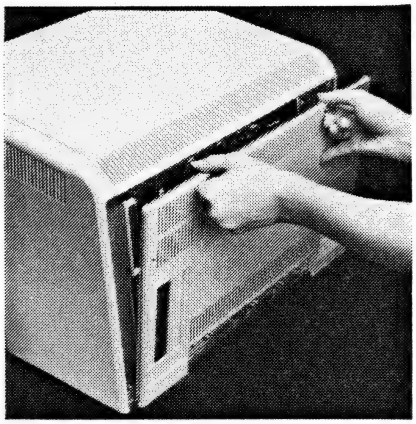
6. Remove the back panel, following this procedure:

   a. Turn the two thumbscrews along the upper edge counterclockwise until they won't turn any further.

      These screws loosen but do not come free from the back panel.



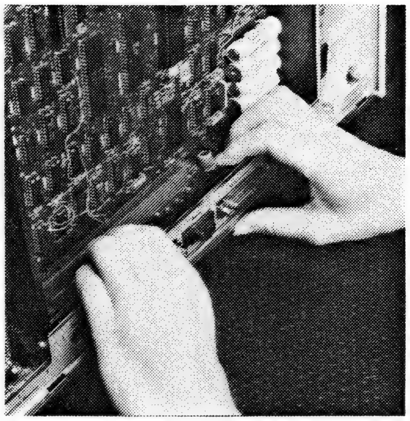
   b. Pull the panel up and toward you.



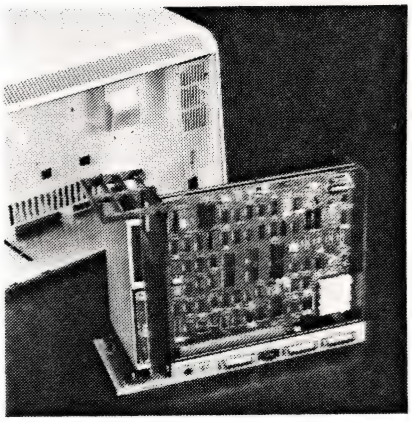
7. Remove the card cage by pulling the bar that runs just above the row of connectors along the bottom of the cage.

   Be careful not to put any pressure on the small components just behind the bar.

   You may have to brace your thumbs against the lower edge of Lisa and pull hard on the bar to free the card cage from the interior connectors.

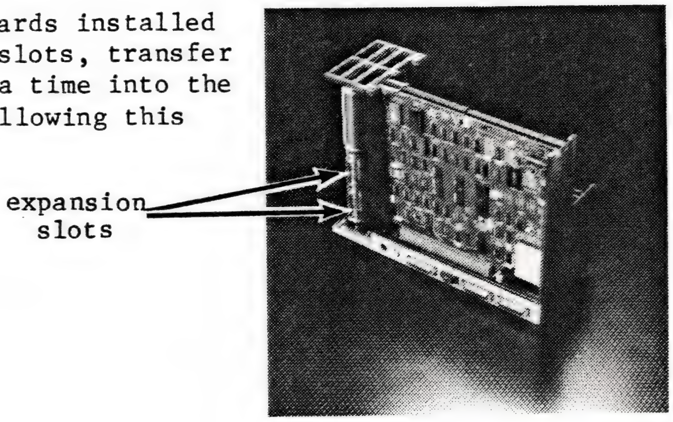


8. Pull the cage out and set it on the table.



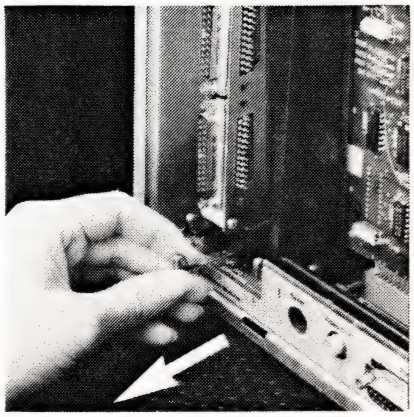
## Transferring Cards

If you have any cards installed in the expansion slots, transfer the cards one at a time into the new card cage, following this procedure:

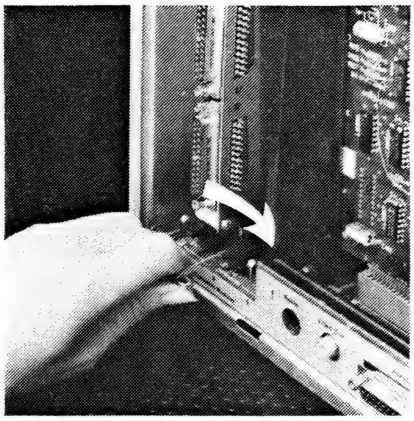


1. Remove each card, following this procedure:

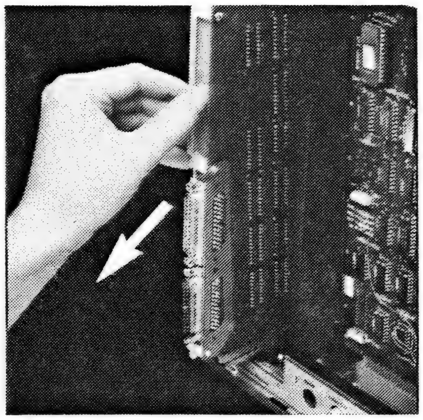
   a. Pull out the metal lever extending from the plastic cap at the bottom of the card you want to remove.



b. Turn the lever clockwise 90 degrees, to the 3 o'clock position.

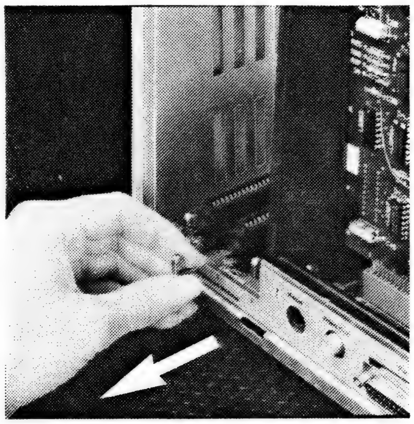


c. Holding the card by the metal edge, pull it straight out of the slot.

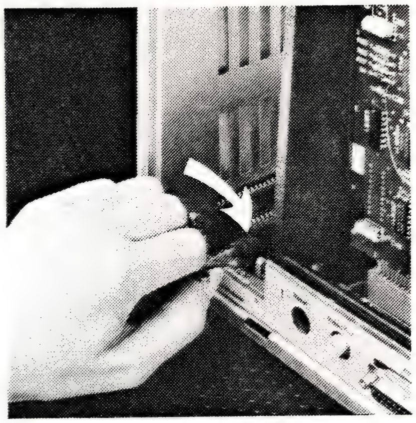


2. Install the card into the corresponding slot in the new card cage, following this procedure:

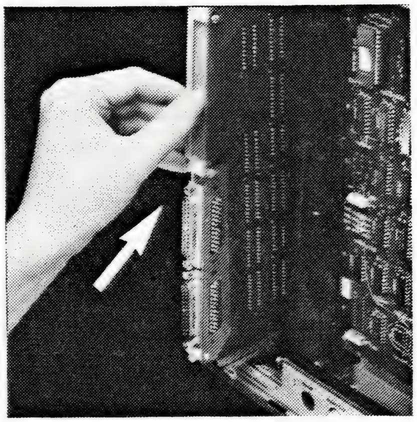
   a. Pull out the metal lever extending from the plastic cap at the bottom of the card slot.



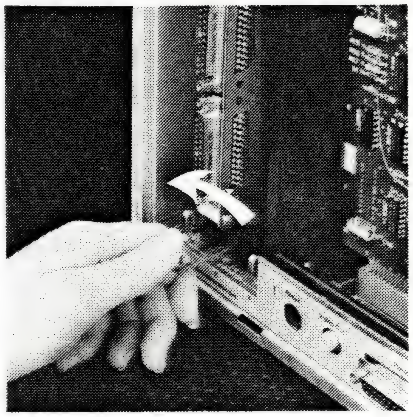
b. Turn the lever clockwise 90 degrees, to the 3 o'clock position.



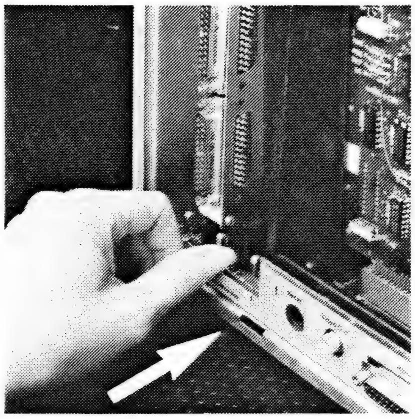
c. Hold the expansion card by the metal edge, with the green plastic facing right and the white cover facing left. Insert the bottom of the green card into the connector slot and the top of the green card into the plastic slot above the connector. Slide the card into the cage as far as it will go.



d. Turn the metal lever counterclockwise 90 degrees, back to the 12 o'clock position.



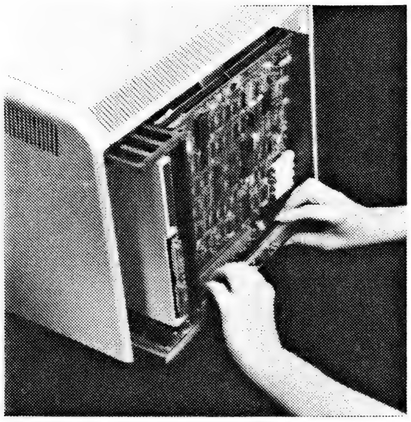
e. Push the lever back into the plastic cap.



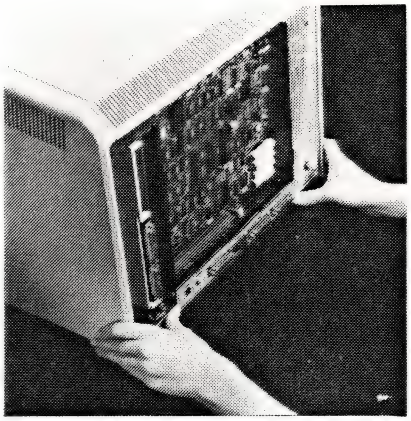
3. Repeat this procedure until all expansion cards have been transferred to the new card cage.

Finishing Up

1. Holding the new card cage by the black plastic rod, slide it into Lisa.

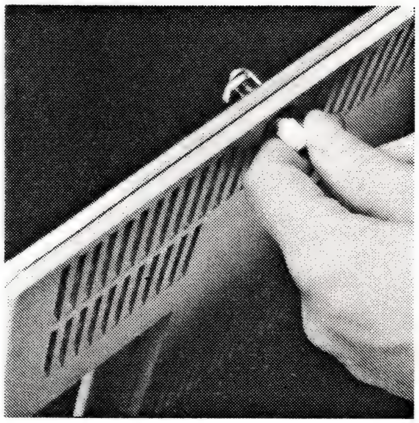


2. The cage will offer some resistance for the last 1/4-inch, while the card cage connectors slide into their slots inside Lisa. You may have to hold the frame with your fingers and press with your thumbs against the bottom of the cage. The cage is installed when the panel along the bottom is just inside of the bottom edge of Lisa.

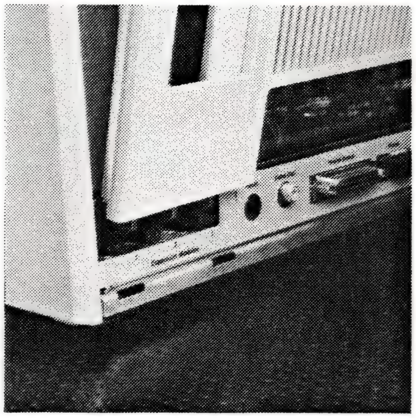


3. Replace the back panel, following this procedure:

   a. Make sure the metal prongs attached to the two screws are pointed to the left.

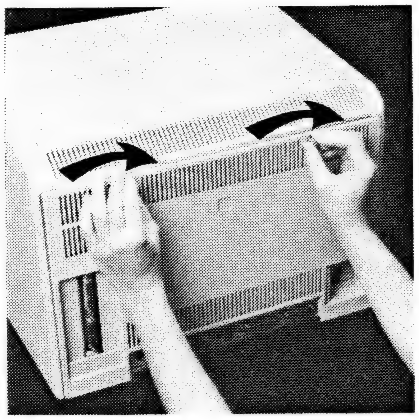


   b. Insert the tabs along the lower edge of the back panel into the slots at the base of Lisa.

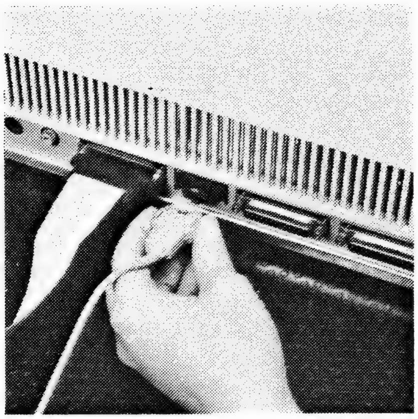


c. Push the panel flat against the back of Lisa. If you encounter resistance, check to make sure that the card cage is pushed as far into Lisa as it will go.

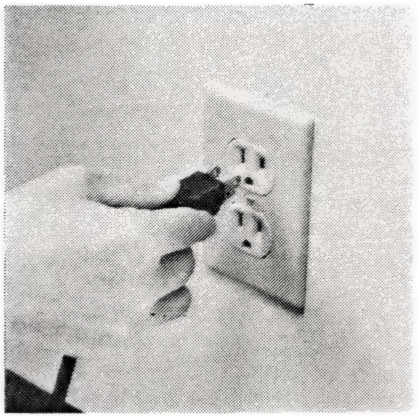
d. Turn the two thumbscrews clockwise until they are snug.



4. Attach the cables to the expansion cards and the bottom edge of the back panel.



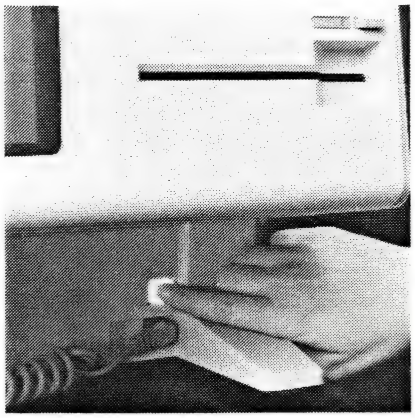
5. Reconnect the power cord, plugging it first into the back of Lisa and then into the wall outlet.



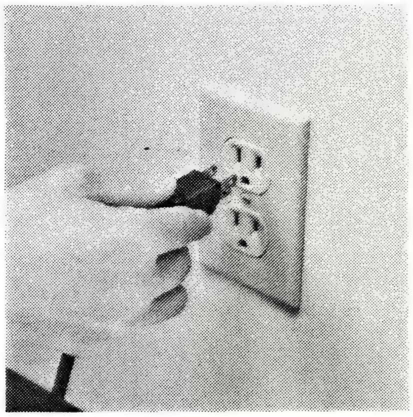
## EXPANSION CARDS

### Getting Inside

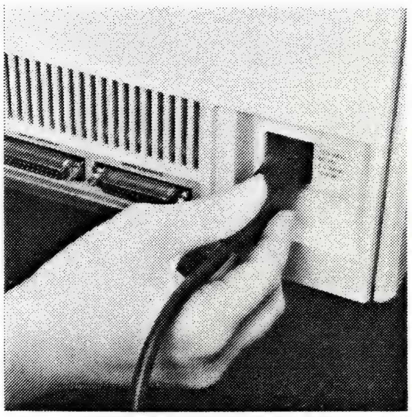
1. Turn off Lisa by pressing the on-off button. Wait until all diskettes are released and the power light is off.



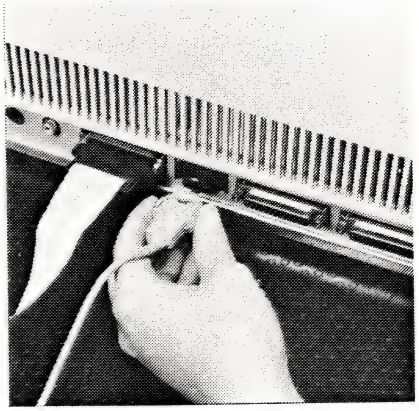
2. Turn off all peripheral devices. Unplug Lisa and all peripherals from the wall outlet.



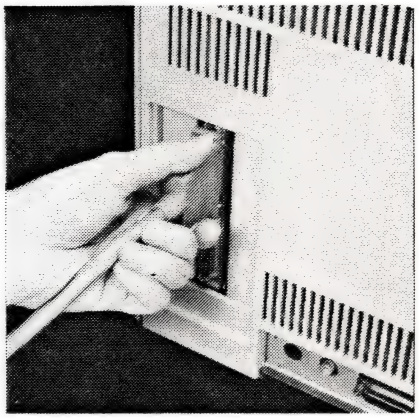
3. Disconnect the power cord from the back of Lisa. Turn Lisa so that the back panel is facing you.



If they are in the way, remove any cables that are attached to the connectors along the bottom edge of the back panel.



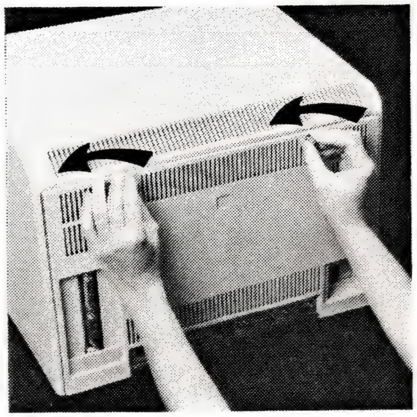
4. Remove any cables extending from the expansion cards on the left side of the back panel.



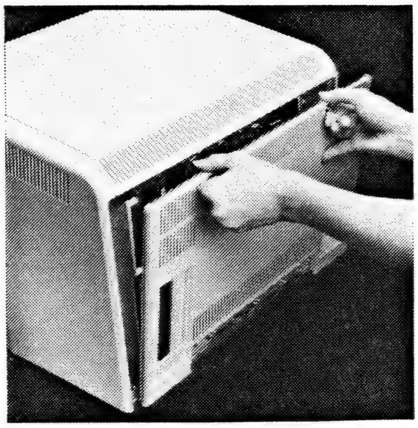
5. Remove the back panel, following this procedure:

   a. Turn the two thumbscrews along the upper edge counterclockwise until they won't turn any further.

      These screws loosen but do not come free from the back panel.



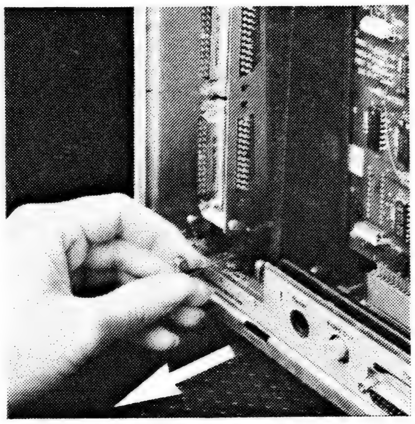
b. Pull the panel up and toward you.



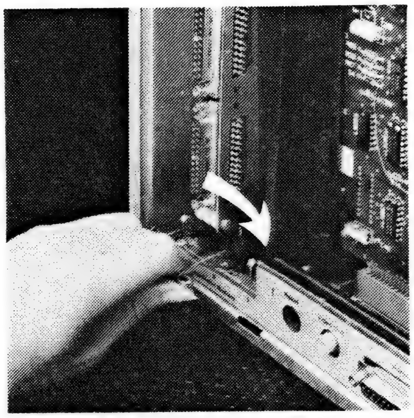
6. If you are simply installing a new expansion card, skip to the section on Installing Expansion Cards, page E37.

Removing Expansion Cards

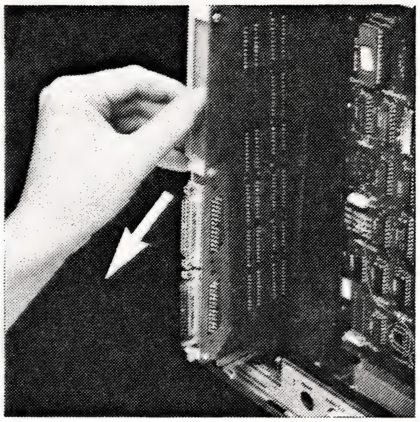
1. Pull out the metal lever extending from the plastic cap at the bottom of the card you want to remove.



2. Turn the lever clockwise 90 degrees, to the 3 o'clock position.



3. Holding the card by the metal edge, pull it straight out of the slot.

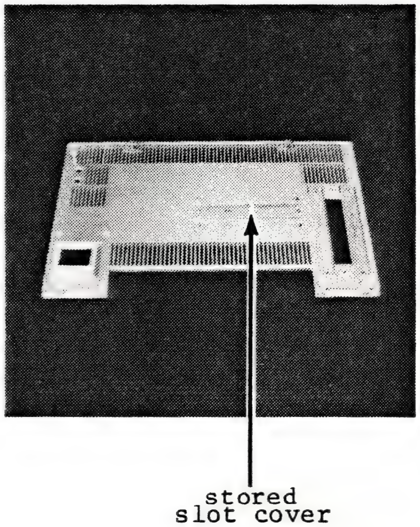


4. If you are replacing the card you just removed with a new card, skip to the section on Installing Expansion Cards, page E37.

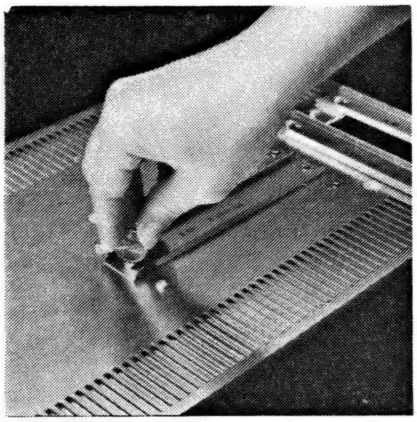
5. Otherwise, follow steps a through e for replacing the slot cover in the back panel of Lisa.

   The slot covers are designed to block the electromagnetic field generated by Lisa. Each expansion slot should be covered by either an expansion card or one of the slot covers.

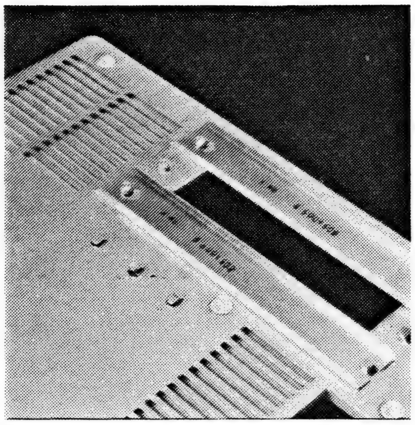
   a. Locate the slot cover, stored on the inside back panel.



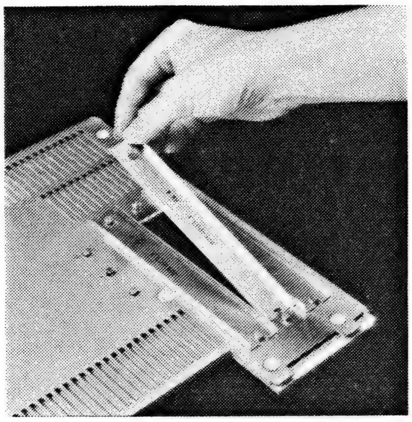
b. Loosen the screw just enough to let the metal plate slide over the screw head and out of the restraining notch. (If you don't have a screwdriver, a coin will work nicely.) Remove the cover and retighten the screw.



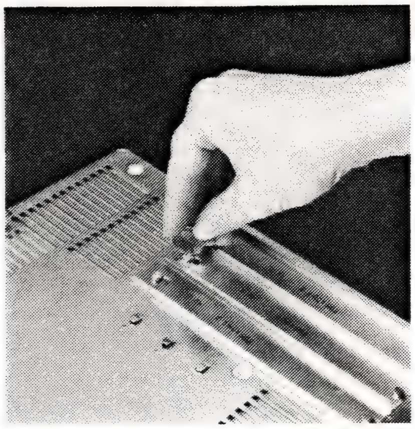
c. Locate and loosen the screw over the opening in the back panel where your expansion card used to be.



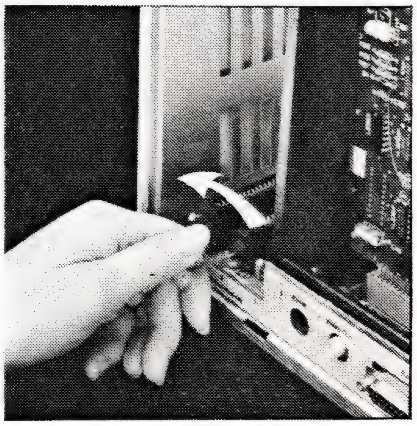
d. Slide the metal plate into the restraining notch and over the screw head.



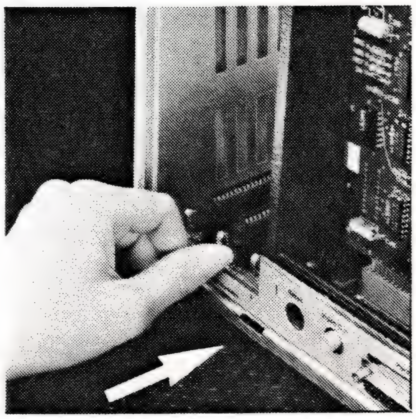
e. Tighten the screw to secure the slot cover.



6. Return to the expansion slot, and turn the metal lever at the bottom of the slot counterclockwise 90 degrees, back to the 12 o'clock position.



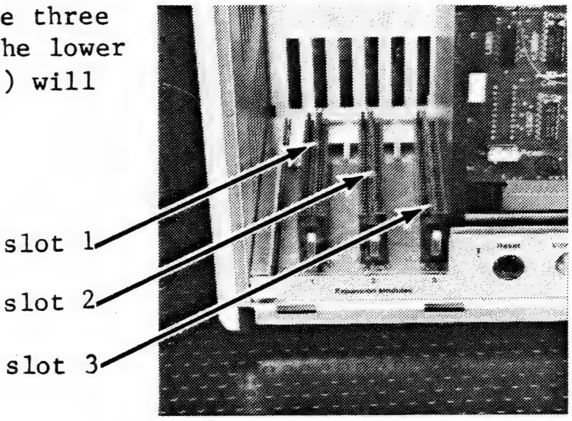
7. Push the lever back into the plastic cap.



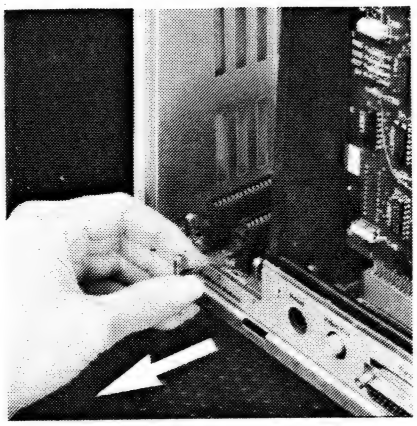
8. Skip to Finishing Up, page E41.

## Installing Expansion Cards

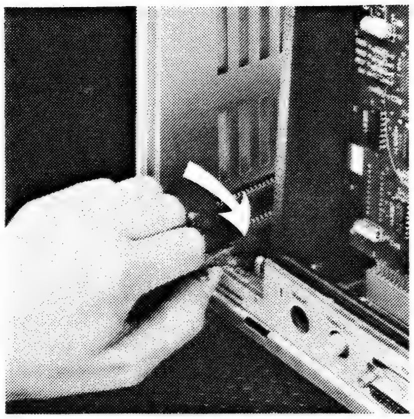
1. Determine which of the three expansion slots (on the lower left of the card cage) will hold the card.



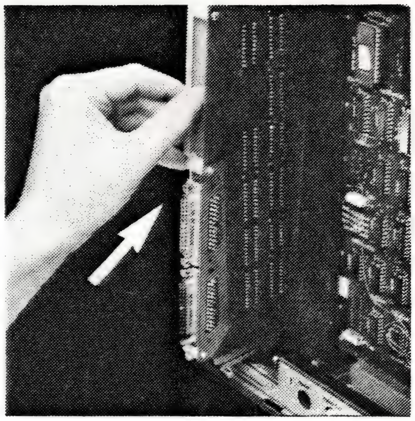
2. Pull out the metal lever extending from the plastic cap at the bottom of the card slot.



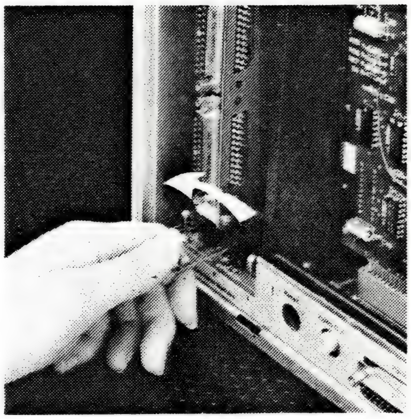
3. Turn the lever clockwise 90 degrees, to the 3 o'clock position.



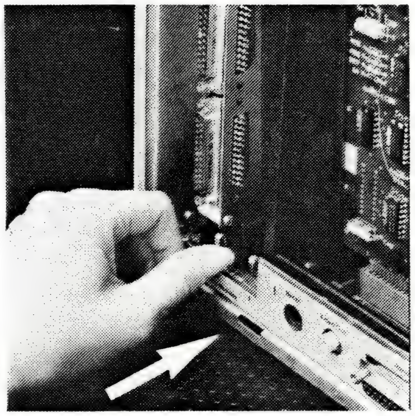
4. Hold the expansion card by the metal edge, with the green plastic facing right and the white cover facing left. Insert the bottom of the card into the connector slot and the top of the green card into the plastic slot above the connector. Slide the card into the cage as far as it will go.



5. Turn the metal lever counterclockwise 90 degrees, back to the 12 o'clock position.



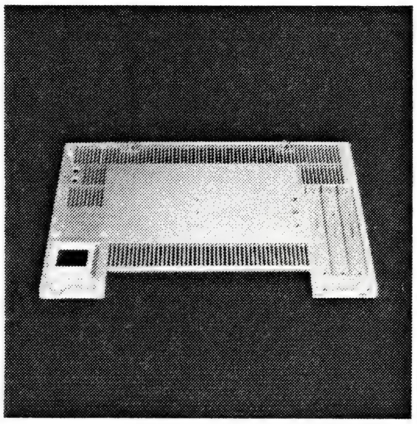
6. Push the lever back into the plastic cap.



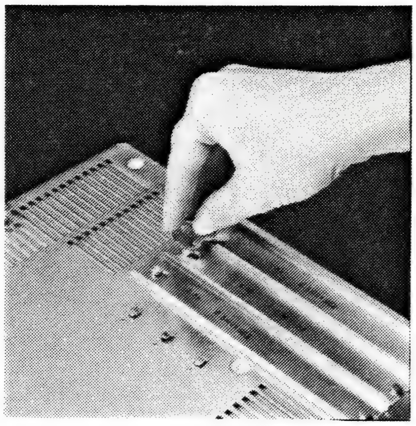
7. A set of slot covers on Lisa's back panel blocks the electromagnetic emissions from inside Lisa. If you have just installed a card into a slot that did not previously contain a card, follow steps a through e for removing the cover that protects that slot.

   Otherwise, skip the lettered instructions and go to Finishing Up, page E41.

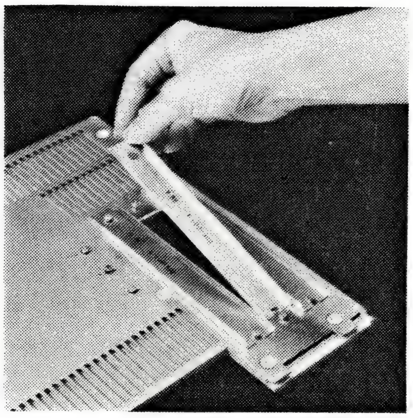
   a. On the back panel, locate the slot cover for the card you just installed.



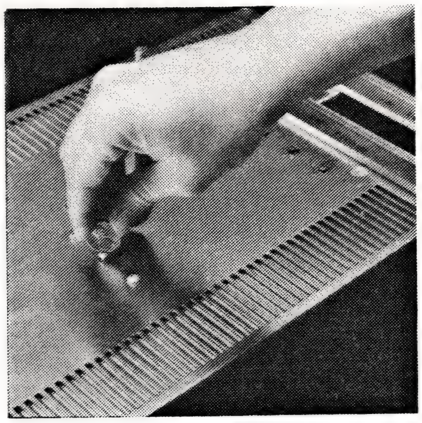
   b. Loosen the screw at the top of the metal plate. (If you don't have a screwdriver, a coin will work nicely.)



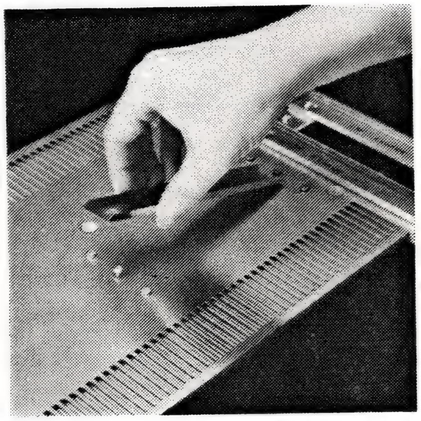
   c. Pull the plate over the screw head and out from behind the retaining notch.



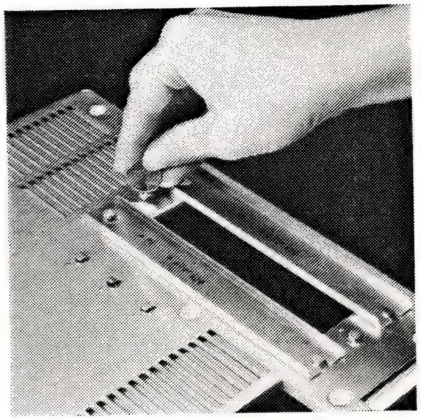
d. Loosen one of the three screws in the middle of the back panel.



e. Slide the metal plate behind the retaining tab and over the screw head.



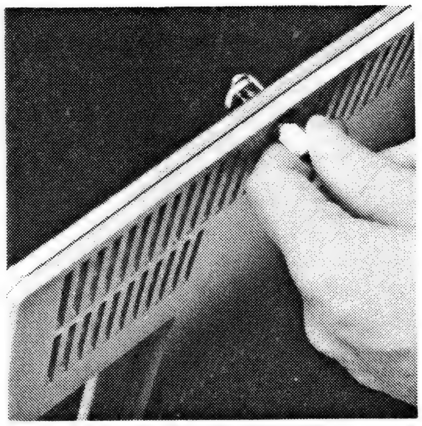
f. Tighten both screws.



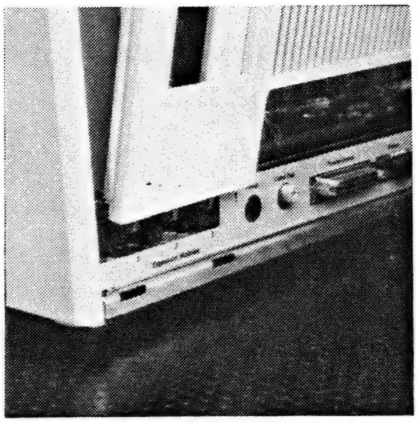
## Finishing Up

1. Replace the back panel, following this procedure:

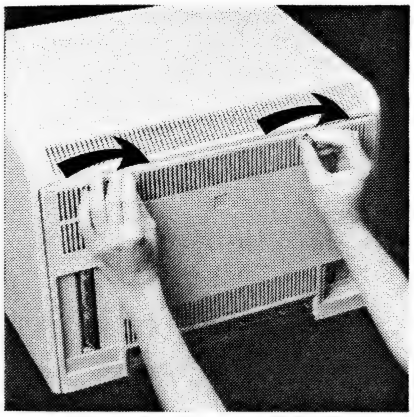
   a. Make sure the metal prongs attached to the two screws are pointed to the left.



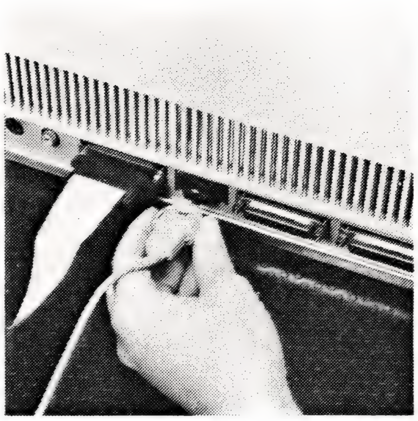
   b. Insert the tabs along the lower edge of the back panel into the slots at the base of Lisa.



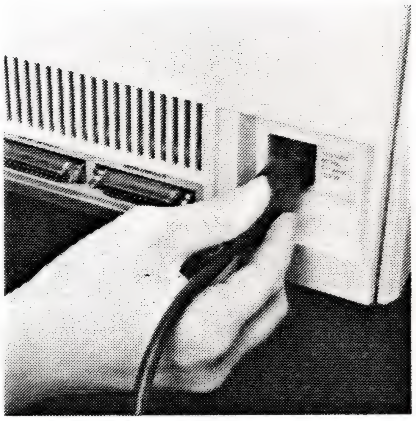
   c. Push the panel flat against the back of Lisa. Turn the two thumbscrews clockwise until they are snug.

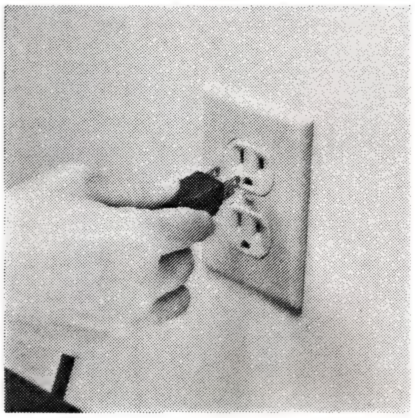


2. Reattach any cables that you removed from the expansion cards or from the bottom edge of the back panel.



3. Reconnect the power cord, plugging it first into the back of Lisa and then into the wall outlet.

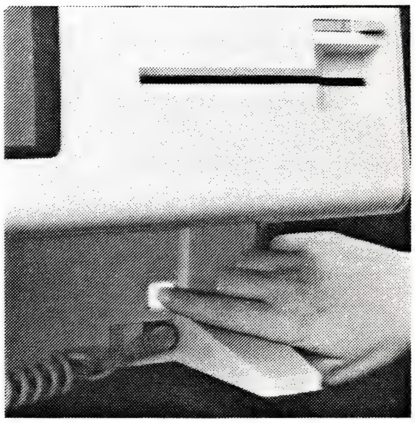




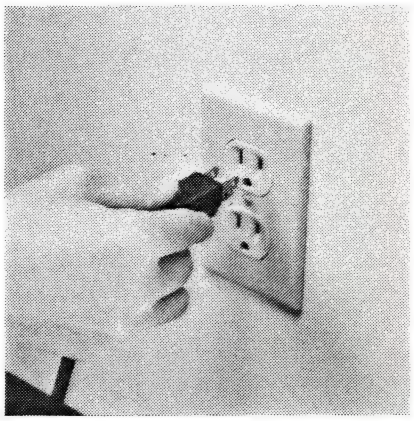
## POWER SUPPLY

### Getting Inside

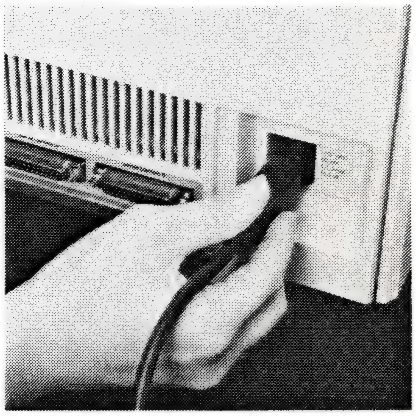
1. Turn off Lisa by pressing the on-off button. Wait until all diskettes are released and the power light is off.



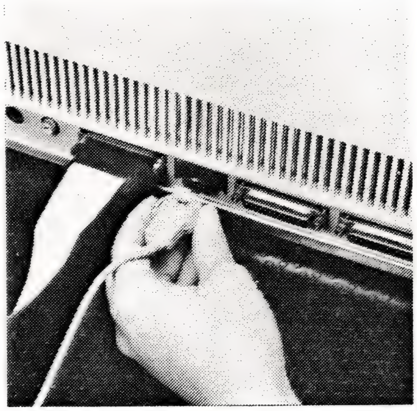
2. Turn off all peripheral devices. Unplug Lisa and all peripherals from the wall outlet.



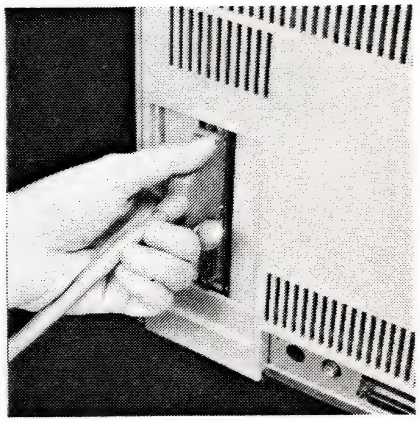
3. Disconnect the power cord from the back of Lisa. Turn Lisa so that the back panel is facing you.



If they are in the way, remove any cables that are attached to the connectors along the bottom edge of the back panel.



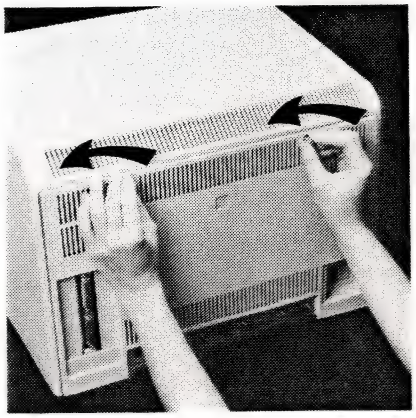
4. Remove any cables extending from the expansion cards on the left side of the back panel.



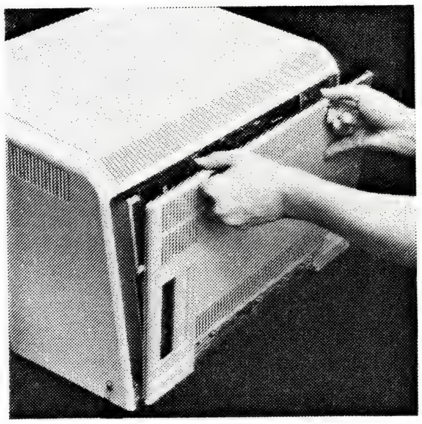
5. Remove the back panel, following this procedure:

    a. Turn the two thumbscrews along the upper edge counterclockwise until they won't turn any further.

    These screws loosen but do not come free from the back panel.



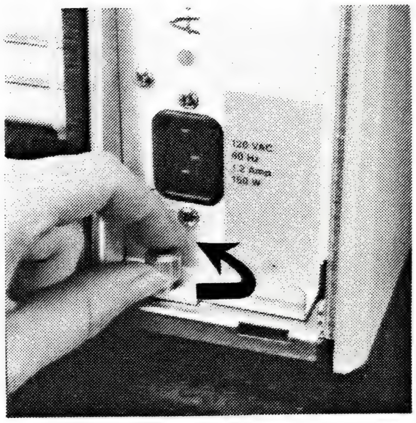
b. Pull the panel up and toward you.



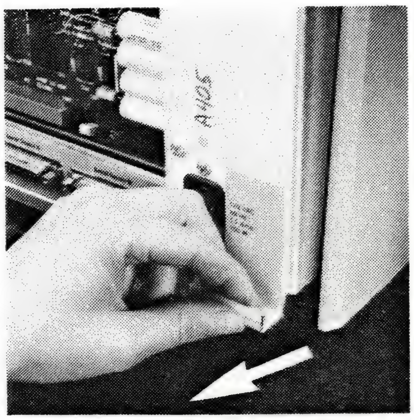
## Replacing Power Supply

1. Turn the screw at the base of the power supply counterclockwise. The screw loosens but does not come free from the module.

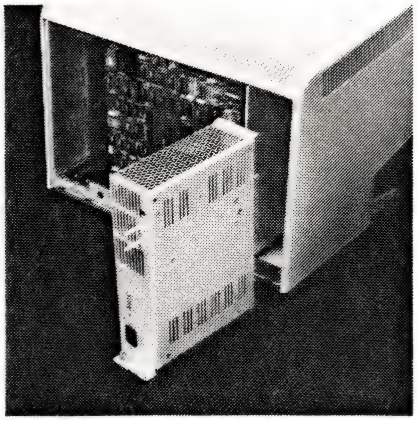
   The screw is loose when you can feel the pressure of the spring behind the screw.



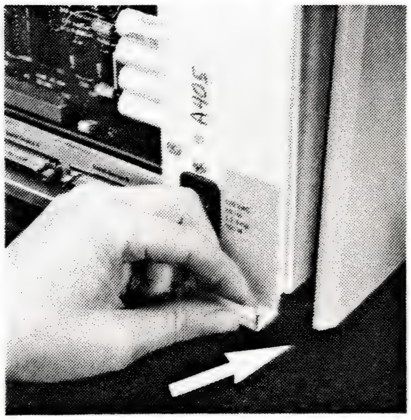
2. Hold the module by the metal tab and pull it out of the cabinet. You may have to jiggle the module to loosen it.



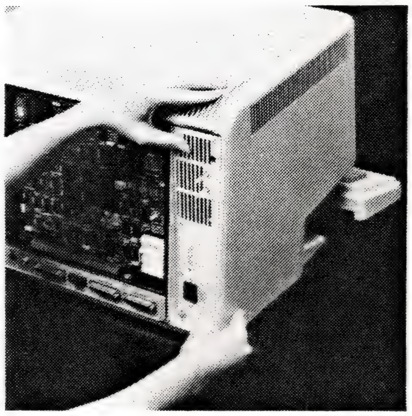
3. Orient the new power supply with the two white prongs pointed toward you and the gold fingers pointed toward Lisa. Do not touch the gold fingers.



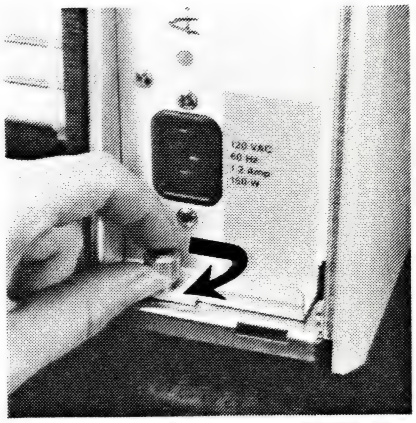
4. Holding the power supply by the metal tab, slide it into Lisa.



5. For the last 1/4-inch, the module will resist insertion. Put one thumb on the bottom and one on the top of the module, and jiggle the power supply into place. It is in place when the top of the power supply is even with the frame and the bottom of the power supply is about 1/4-inch inside the frame.



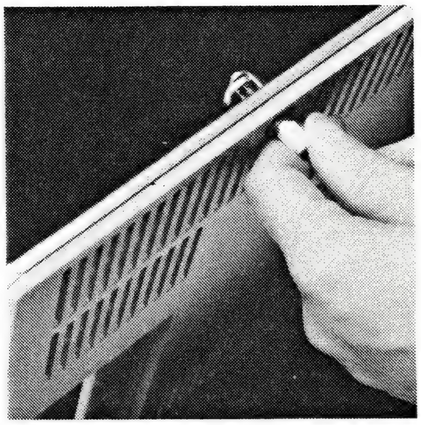
6. Push the screw down, and then turn it clockwise until it is tight.



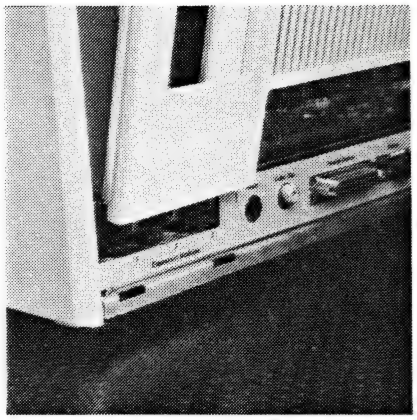
## Finishing Up

1. Replace the back panel, following this procedure:

   a. Make sure the metal prongs attached to the two screws are pointed to the left.

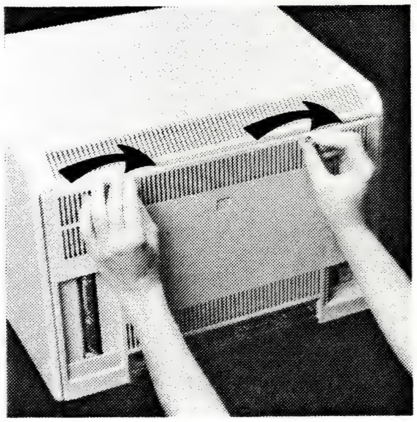


   b. Insert the tabs along the lower edge of the back panel into the slots at the base of Lisa.

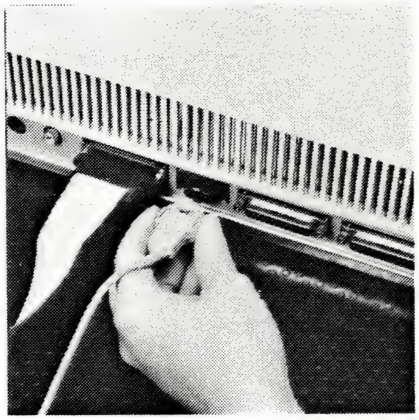


c. Push the panel flat against the back of Lisa. If you encounter resistance, check to make sure that the power supply is pushed as far into Lisa as it will go.

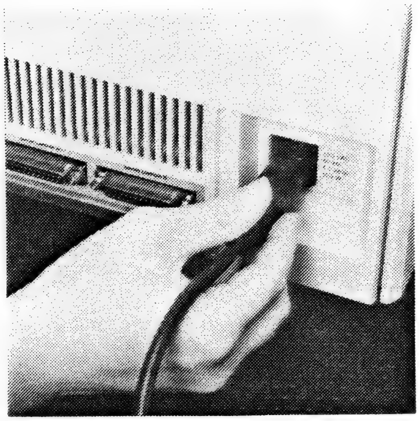
d. Turn the two thumbscrews clockwise until they are snug.

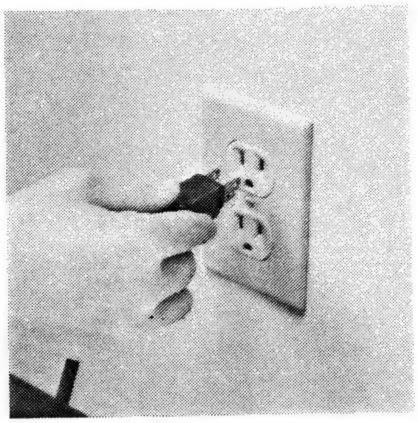


2. Reattach any cables that you removed from the expansion slots or from the bottom edge of the back panel.



3. Reconnect the power cord, plugging it first into the back of Lisa and then into the wall outlet.



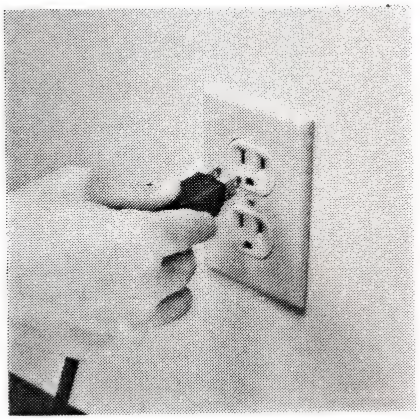


## GLARE FILTER

### Getting Inside

1. Turn off Lisa by pressing the on-off button. Wait until all diskettes are released and the power light is off.

2. Unplug Lisa from the wall outlet.

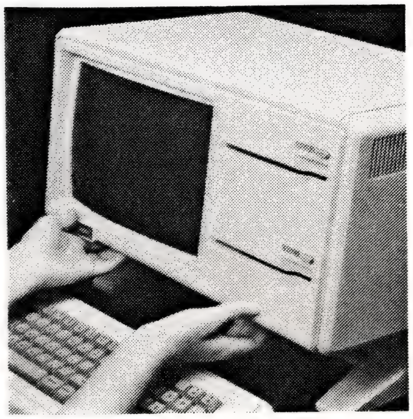


3. Remove the front panel, following this procedure:

   a. Place one finger on each of the two dished finger pads beneath the front panel.

   b. Push the pads up to unlatch the panel.

   c. Pull the panel forward and down.

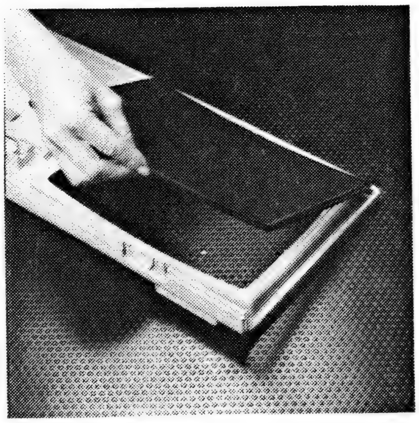


4. Set the panel on a flat surface, face down.

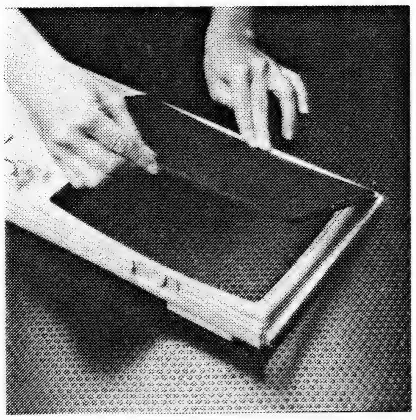
(graphic to come)

## Installing Glare Filter

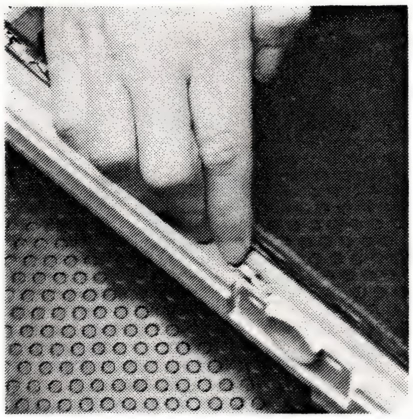
1. Hold the glare filter against the clip along the upper edge of the front panel, at a 45 degree angle.



2. While pressing down on the frame at the upper clip, rotate the lower edge until the frame slides under the upper clip.



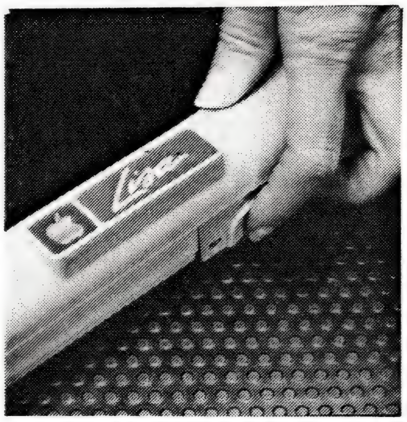
3. Push the lower edge of the frame in until it clears the lower clip, and then let it slide into place behind the clip.



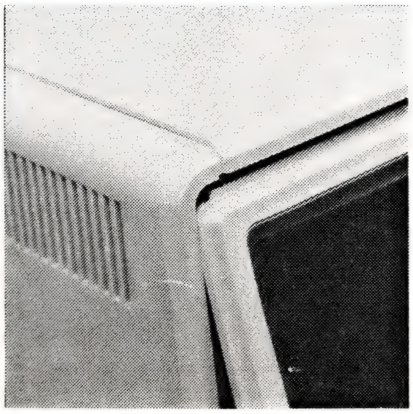
## Finishing Up

1. Replace the front panel, following this procedure:

   a. Hold the panel with one finger on each dished pad along the bottom edge.

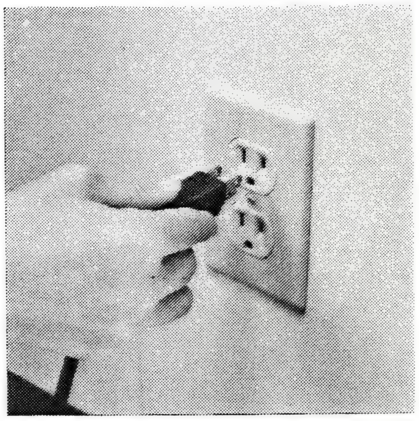


   b. Insert the upper edge of the panel behind the lip of the top housing on Lisa.



c. Pressing the dished pads up, push the bottom edge of the panel against Lisa until the panel clicks into place.

2. Plug in the power cord.



F

Appendix

# SECTION F. APPENDIX

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## 1. Setup Procedures

Refer to this appendix when you are setting up Lisa. These instructions appear as a separate sheet in the Lisa accessories box, and they are repeated here for future reference.

## 2. Handling Diskettes

Read this appendix to learn about caring for diskettes.

## 3. Automatic Startup Tests

Refer to this appendix if you want to know what is happening during the first few seconds of system startup or when you are trying to interpret a startup error message. You may be directed to this appendix by Section D, Troubleshooting.

## 4. On-Off Procedures

Read this appendix for a summary of how Lisa's on-off button works.

## 5. Hardware Specifications

Refer to this appendix for information on the size, weight, hardware compatibility, and other hardware specifics of Lisa.

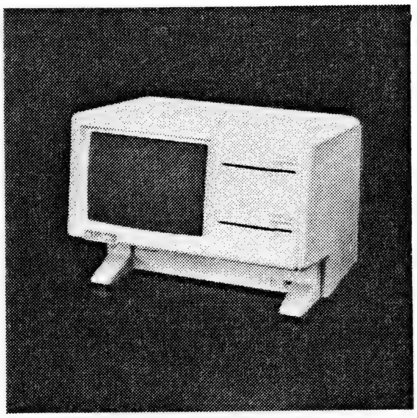
## 6. Moving and Storing Lisa <<to come>>

Refer to this appendix when you plan to move or store Lisa.

# APPENDIX 1. SETUP PROCEDURES

1. Find the packing list in the accessories box and check to be sure that you have everything on the list. If you don't, contact your dealer.

2. Unpack Lisa following the instructions printed on the carton. Set the cabinet on a hard, flat surface, with 2 inches of clearance on all sides.



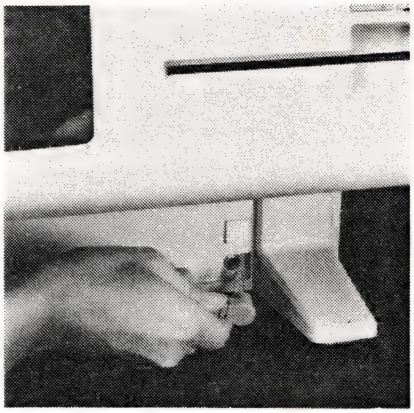
3. Install all peripheral devices:

   a. If you have a ProFile, set it up following the directions that came with the ProFile.

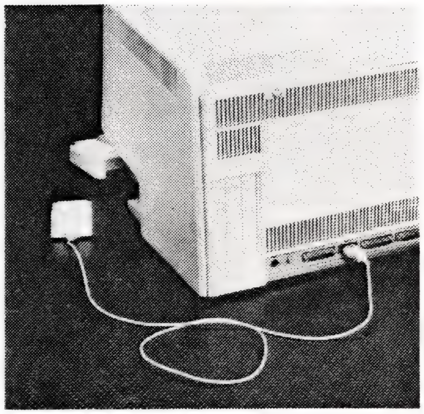
   b. If you have a dot matrix printer, set it up following the directions that came with the printer. Note that if you also have a ProFile, you have to install a Parallel Interface Card before you can set up your dot matrix printer. To install the Parallel Interface Card, follow the instructions that came with the card. Then install the dot matrix printer.

   c. If you have a daisy wheel printer, set it up following the directions that came with the printer.

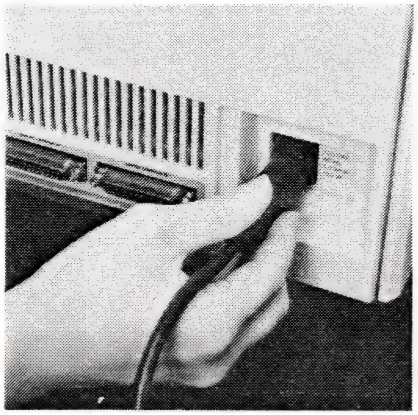
4. Plug the keyboard cord into the front of the cabinet.

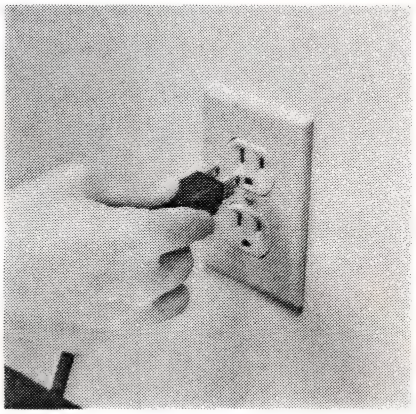


5. Plug the mouse cord into the back of the cabinet.

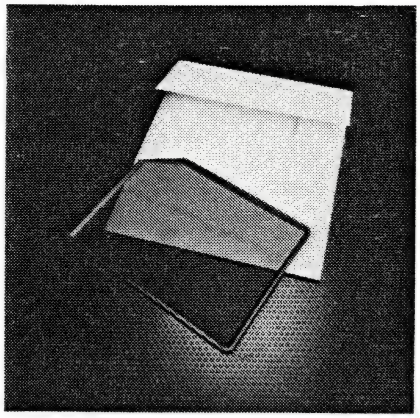


6. Plug the power cord into the back of Lisa, and then into the wall socket.





7. Under some lighting conditions, reflections can make the video screen hard to read. If glare is a problem on your Lisa, install the nonglare filter following the instructions in Section E, Service, in the Lisa Owner's Guide.



8. Go to Section A, LisaGuide, in the Lisa Owner's Guide, to begin learning to use Lisa.

## Safety Precautions

To ensure safe and reliable operation:

- Set Lisa on a clean, flat surface, with at least 2 inches of clearance on all sides. Do not turn the machine on if it is sitting on a soft surface.

  Do not let papers, books, or anything else block the flow of air to the vents under the cabinet.

- Turn off Lisa by pressing the on-off button and unplugging the system before removing the front or back panel. The on-off button by itself does not cut all power to Lisa.

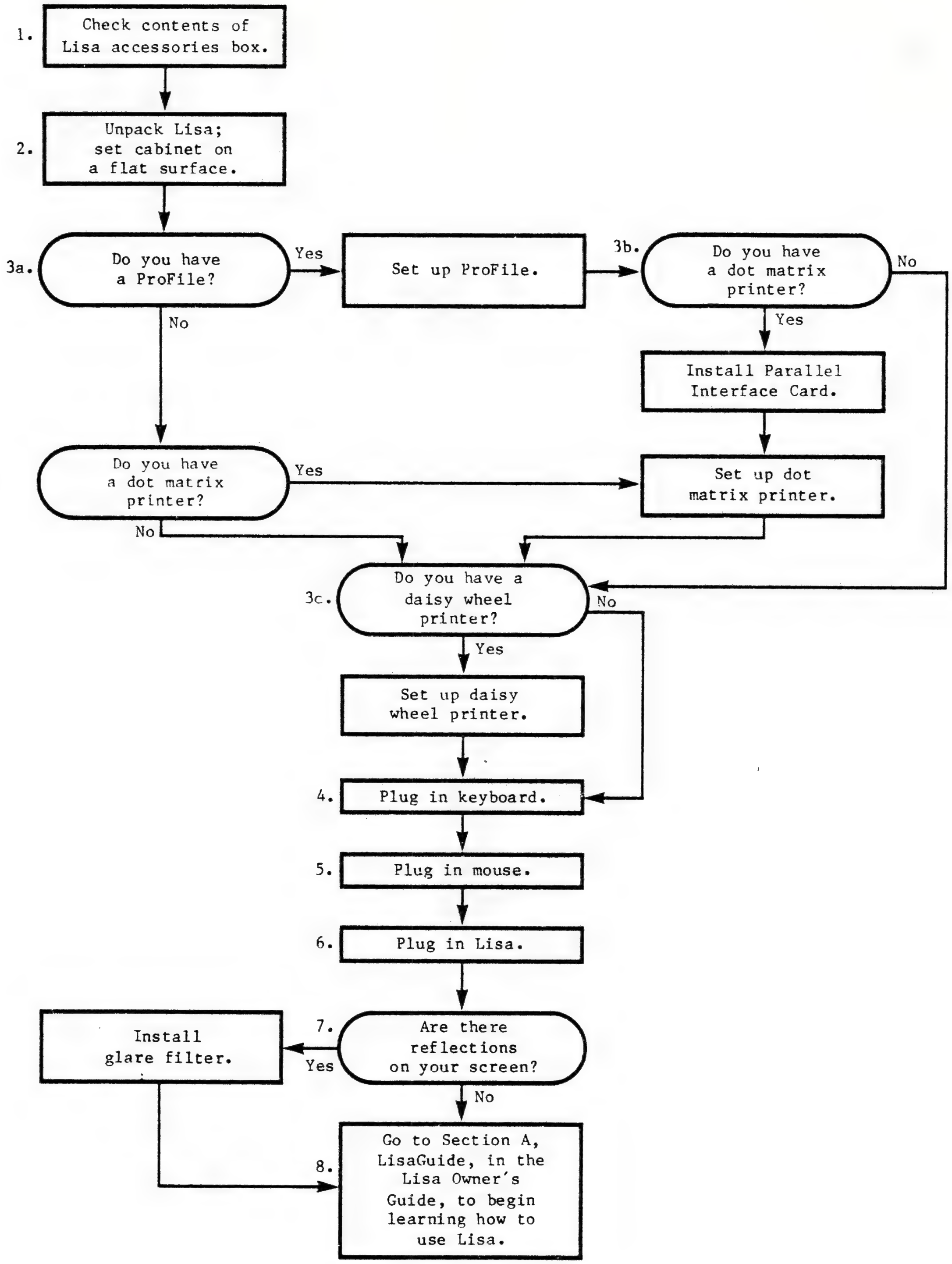
- Keep jewelry, coins, paper clips, and other small objects away from the air vents. Do not insert anything but diskettes into the disk drive slots.

- Do not try to service the video unit or the power supply. You may replace the entire power supply unit, following the instructions in Section C, Maintenance, but do not open up the power supply.

- When unplugging the system for moving or servicing, always push the on-off button first, and then wait until the on-off light goes out before removing the plug from the wall outlet.

- This equipment is intended to be electrically grounded. It is equipped with a 3-wire grounding-type plug, which is a plug having a third (grounding) pin. This plug will fit only into a grounding-type AC outlet. If you are unable to insert the plug into the outlet, contact a licensed electrician to replace the outlet and, if necessary, to install a grounding conductor.

# Lisa Setup Procedures


1.
Check contents of Lisa accessories box.
2.
Unpack Lisa; set cabinet on a flat surface.
3a.
Do you have a ProFile?
Yes
Set up ProFile.
3b.
Do you have a dot matrix printer?
No
Yes
Install Parallel Interface Card.
No
Do you have a dot matrix printer?
Yes
Set up dot matrix printer.
No
3c.
Do you have a daisy wheel printer?
No
Yes
Set up daisy wheel printer.
4.
Plug in keyboard.
5.
Plug in mouse.
6.
Plug in Lisa.
7.
Are there reflections on your screen?
Yes
Install glare filter.
No
8.
Go to Section A, LisaGuide, in the Lisa Owner's Guide, to begin learning how to use Lisa.

# APPENDIX 2. HANDLING DISKETTES

## Caring for Diskettes

A floppy diskette is a sensitive, magnetic storage medium, encased in a protective plastic jacket. Like an audio tape, it is vulnerable to damage from fingerprints, dust, scratches, and magnetic charges. To protect the information stored on your diskettes, follow these precautions:

- Handle diskettes by the plastic jacket only. Never touch the shiny recording surface.

- Store diskettes in their paper sleeves when not in use. These sleeves are chemically treated to keep out dust.

- Keep diskettes away from magnetic fields. Note that most high-intensity desk lamps contain a transformer in the base, which emits an electromagnetic field strong enough to erase a diskette. Therefore, do not lean diskettes against your desk lamp.

- Store diskettes between 10 and 52 degrees Celsius (50 to 125 degrees Fahrenheit). Do not leave diskettes on top of Lisa or in direct sunlight.

- Do not bend diskettes. Never use paper clips or staples on diskettes.

- When writing diskette labels, use a felt-tip pen, never a pencil or ballpoint pen. The safest procedure is to prepare the label while it is still on the paper backing sheet and to transfer the label to the diskette.

## Backing Up Diskettes

Because diskettes can be damaged or erased accidentally -- and because they eventually wear out with use -- you should keep backup copies of all diskettes. For a discussion of backing up diskettes, see Section B, Lisa Fundamentals, in the manual that came with any Lisa tool, or the System Utilities section of the Lisa Development System manual.

# APPENDIX 3. AUTOMATIC STARTUP TESTS

---

Every time you turn Lisa on, the system itself runs a series of tests to verify that startup can proceed. This appendix describes the tests in the order that they are run, explains the error messages generated by the startup tests, and explains your options when presented with a startup error message.

## Startup Test Sequence

If everything is working correctly during startup, the tests proceed in the following sequence.

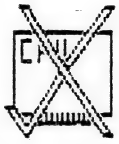
ROM Checksum: This test computes a 16-bit checksum of the entire ROM to check its validity. If the result is zero, the system passes on to the next test.

If the system fails the ROM checksum, the system hangs. The screen may be blank, or it may display a random pattern at a very bright contrast level.

MMU Register Test: This is a read/write and address test of the static RAMs in the memory management unit. Successful completion is followed by the next test.

An early failure causes the test to repeat indefinitely, with a blank display on the screen.

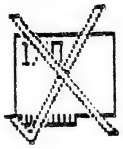
If this test reaches its final stages and then encounters a failure, the screen displays the CPU board icon, with error code 40.

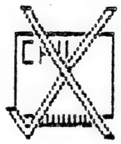


Memory Sizing: This test determines the amount of memory in your system, to facilitate further testing. If an error is found, the error is saved but testing continues. If memory cannot be accessed at all, the speaker beeps once with a low tone and the system hangs with a series of vertical lines on the screen.

Preliminary Memory Test: Next the system tests the first 2048 bytes of memory, to ensure that some memory is available for use by the startup ROM. If an error occurs, Lisa sounds the speaker twice and then hangs in a test loop, with a random display on the screen.

Parallel Port VIA Test: This test verifies that the I/O board can be accessed, and it does a partial test of the parallel port. Failure results in either the I/O board icon, with error code 58, or the CPU board icon, with error code 41.





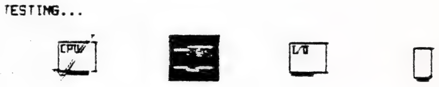
If this test proceeds without problems, the screen contrast is turned all the way down.

Screen Memory Test: This test facilitates the reporting of errors that are found during other tests. Errors do not interrupt the tests but are reported at the end of startup as a memory failure.

I/O Board Tests: The contrast is set to midrange, and the keyboard and mouse connections are checked. If either the keyboard or the mouse is not connected, Lisa alerts you to the situation at the end of the startup sequence. If those tests proceed normally, a click is emitted from the speaker. This click tells you that all tests up to this point have been executed and that the keyboard is ready to accept alternative startup device commands. The procedure for giving an alternative startup command is described in Appendix 4, On-Off Procedures, under Alternative Startup Procedure.

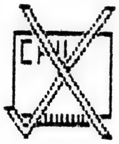
From this point, the screen displays a series of icons showing which test is in progress. While a board is being tested, its icon is highlighted on the screen. As each board passes the tests, Lisa displays a check mark over the icon. Usually, the video screen has not had time to warm up at this point, so you will rarely see this display.

Errors detected during the following tests are reported both by a screen message and by a two- or three-note error tone. Error messages and tones appear in Tables 1 and 2 on pages F3-7 through F3-11.



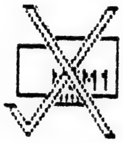
CPU Board Test Completion: The remainder of the CPU board tests partially check the video and write wrong parity circuitry. If either test fails, testing is terminated and the CPU board icon is displayed with one of two error codes:

42 -- Video logic error
43 -- Parity logic error

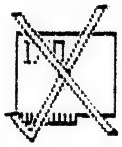


Memory Test: The final memory check is a full read/write and address check of all RAM not yet tested. The test takes about 15 seconds for a full megabyte of memory. In extended mode, the test takes twice as long.

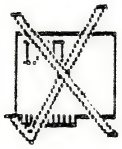
Errors detected in this test are displayed at the end of the startup sequence. The memory board icon with error code 70 indicates read/write errors, and the memory board with error code 71 indicates parity errors.



I/O Board Test Completion: This test verifies that the disk controller is ready, checks shared memory, and then disables the disk interrupts until startup is complete. Errors are displayed as an I/O board icon with error code 57.

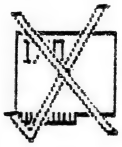


Lisa then tests the serial port controller. Errors are displayed as an I/O board icon, with error code 55 for port A errors and with error code 56 for port B errors.



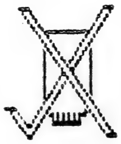
After these tests, the speaker emits a double click and Lisa scans the keyboard for any keystrokes entered since the first click. Lisa then reads the clock/calendar and saves the time and date information for later use.

Errors in reading the keyboard or the clock are displayed as an I/O board icon, with error code 52 for the I/O board COPS, which controls the keyboard and mouse interface, or with error code 54 for the clock/calendar.



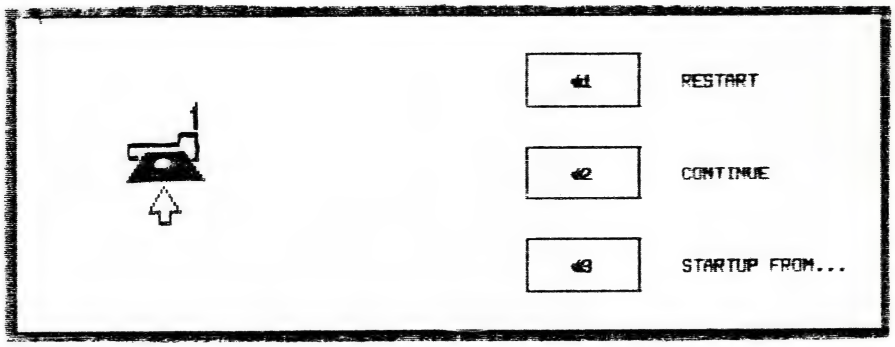
I/O Slot Configuration Check: Finally, the system scans each expansion slot to see if a card is present. The results are stored for future use, but are not compared with the information in parameter memory.

If this check uncovers a bootable device in any slot, Lisa scans the required ROM on the card to ensure that it can be read properly. An error here is displayed as an expansion card icon, with error code 92.



### Responding to Startup Error Messages

Some startup error messages are presented to you as a dialog box, which gives you up to three choices:



You make your choice either by clicking on one of the boxes or by holding down the Apple key while pressing the number displayed in the box.

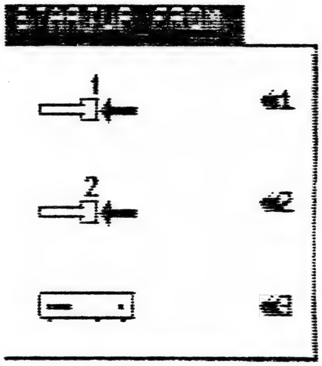
Restart: If you choose Restart, Lisa repeats the startup procedures, including the startup tests. Choose Restart if you want to verify the test results.

Continue: The Continue box appears only if the problem is one that allows startup to continue. If, for example, your startup disk was not installed in the startup drive, you can simply insert the startup disk and click Continue. Lisa then continues the startup procedures.

Startup from: When you choose Startup From, Lisa displays the Startup menu and waits for you to specify a startup drive. Choose this option when you want to use a different startup drive than that specified in Preferences or when your Preferences have been lost.

If Lisa has been unplugged for more than 20 hours, then the Preferences, usually stored in parameter memory, have been forgotten. In this case, Lisa automatically assumes drive 1 to be your startup drive. If your startup disk is a diskette in drive 2 or a hard disk, you will have to tell Lisa where to find it through the Startup menu.

To choose a startup device, click on the drive you want to use or hold down the Apple key while pressing the key listed in the menu next to the drive you want to use. As soon as you choose a startup device, Lisa continues the startup procedures, looking in that drive.



## Startup Error Messages and Tones

Each startup error message can consist of three parts:

- An icon representing the module that caused the problem.
- A numeric code indicating what kind of problem it is.
- A one-, two-, or three-note error tone indicating either which module caused the problem or what kind of problem it is.

Some of the error messages indicate a physical problem with Lisa; others indicate a problem with the system setup. In general, the presence of an icon with or without a numeric code means that the module represented by the icon should be replaced. For module replacement procedures, see Section E, Service.

The meanings of the error tones are summarized in Table 1, and the meanings of the numeric codes are summarized in Table 2.

Table 1. Startup Error Tones

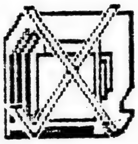
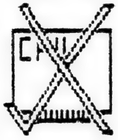
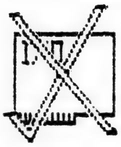
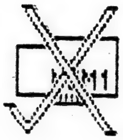
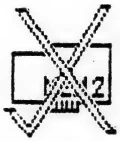
| Icon | Tones | Meaning |
|---|---|---|
| No icon displayed | Lo | CPU or memory error. Must be diagnosed by a qualified service technician. |
| No icon displayed | Lo,Lo | Memory failure in preliminary test. Replace one or both memory boards. See Section D, Troubleshooting, Procedure W. |
| Card cage  | Lo,Hi | A problem somewhere in card cage. Run the complete Diagnostics check to identify which board is causing the problem. See Section D, Troubleshooting, Procedure Z. |
| CPU board  | Lo,Lo,Hi | Replace CPU board. |
| I/O board  | Lo,Hi,Lo | Replace I/O board. |
| Memory board   | Lo,Hi,Hi | Replace specified memory board. |

Table 1. Startup Error Tones, continued

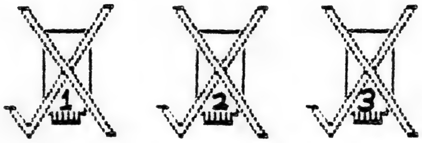
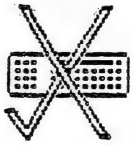
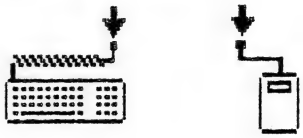
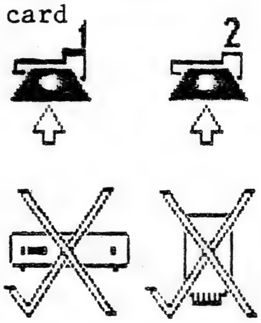
| Icon | Tones | Meaning |
|---|---|---|
| Expansion card<br><br> | Hi,Lo,Lo | Replace expansion card in specified slot. |
| Keyboard<br> | Hi,Lo,Hi | Replace keyboard. |
| Keyboard/ mouse disconnected<br> | Hi,Hi,Lo | Keyboard or mouse disconnected. Continue without keyboard or mouse, or attach keyboard or mouse. If both are attached, run keyboard or mouse Diagnostic. See Section D, Troubleshooting, Procedure Z. |
| Disk drive, ProFile, or expansion card<br><br> | Hi,Hi,Hi | Startup failure. Insert startup disk, specify a different startup drive, or check startup drive. See Section D, Troubleshooting, Procedures T, U, and V. |

Table 2. Startup Error Messages

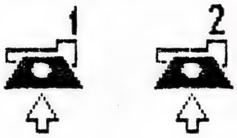
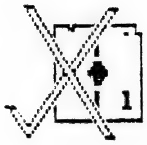
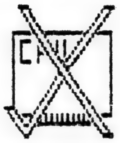
| Icon | Code | Meaning |
|---|---|---|
| Disk drives<br> | 7 | No diskette in startup drive. |
| Diskette<br> | 20 | Diskette write protected. |
| | 21 | Unable to verify diskette. |
| | 22 | Unable to clamp diskette. |
| | 23 | Unable to read diskette. |
| | 24 | Diskette write protected. |
| | 38 | No startup file on diskette. |
| | 39 | Disk controller timeout. |
| | 75 | Startup failure; startup file on diskette probably bad. |
| CPU board<br> | 40 | MMU error. |
| | 41 | CPU selection logic error. |
| | 42 | Video circuitry error. |
| | 43 | Parity circuitry error. |
| | 44 | Unexpected NMI interrupt. |
| | 45 | Bus error. |
| | 46 | Address error. |
| | 47 | Other unexpected exception. |
| | 48 | Illegal instruction error. |
| | 49 | Line 1010 or 1111 trap. |

Table 2. Startup Error Messages, continued

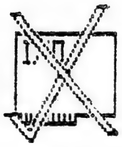
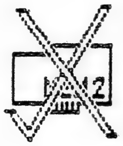
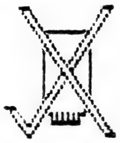
| Icon | Code | Meaning |
|---|---|---|
| I/O board<br> | 50 | COPS VIA error. |
| | 51 | Parallel port VIA error. |
| | 52 | I/O board COPS error. |
| | 53 | Keyboard COPS error. |
| | 54 | Clock error. |
| | 55 | RS232 port A error. |
| | 56 | RS232 port B error. |
| | 57 | Diskette controller error. |
| | 58 | I/O board access error. |
| | 59 | I/O board COPS code error. |
| | 60 | I/O or keyboard error. |
| Memory board<br> | 70 | Memory read/write error. |
| | 71 | Memory parity error. |
| ProFile<br> | 80 | ProFile not attached to parallel port. |
| | 81 | ProFile not ready. |
| | 82 | Bad response from ProFile. |
| | 83 | Nonzero status bytes returned from ProFile. |
| | 84 | Invalid boot file on ProFile. |
| | 85 | ProFile timeout. |

Table 2. Startup Error Messages, continued

| Icon | Code | Meaning |
|---|---|---|
| Expansion card<br> | 90 | No expansion card installed. |
| | 91 | Expansion card not bootable. |
| | 92 | Bad checksum on expansion card. |
| | 93 | Bad status returned from expansion card. |

# APPENDIX 4. ON-OFF PROCEDURES

The single button that turns Lisa on and off is a "soft" power button. It does not directly control power to the computer. When you press the button to turn Lisa on, you are bringing the system up from a standby condition to a fully active state. When you press it to turn Lisa off, you are triggering a series of verification and storage procedures that eventually turn the system off. This appendix summarizes the on-off procedures, including the alternative startup procedure.

## Standby Status

As long as Lisa is plugged in, it draws a small amount of current, which it uses to keep the clock/calendar up to date and to remember your Preferences. A battery inside Lisa can power the clock and a small amount of system memory -- known as parameter memory -- for up to 20 hours so that you can move and service the machine without resetting all system information. When you must unplug Lisa, push the on-off button and wait for the light to go out before removing the plug from the wall outlet. When you have finished moving or servicing Lisa, plug Lisa back in as soon as possible, even if you do not need to turn it on immediately.

## Turning Lisa On

When you press the on-off button to bring Lisa up from the standby condition to an active state, the computer runs a series of self-tests to verify that startup is possible. These tests and related error messages are described in Appendix 3, Automatic Startup Tests.

Each time you turn Lisa on, the system must read a collection of startup instructions from a special startup disk. This disk can be either a hard disk copy or a diskette copy of the Desktop Manager Startup Master, which came with the Lisa Owner's Guide, or the Development System Startup Master, which came with the Lisa Development System manual.

The disk drive that holds the Desktop Manager Startup disk is called the startup device. If you are using one of the built-in floppy disk drives as your startup device, a copy of the startup diskette must remain in the drive as long as you are using Lisa, except for brief periods during a few specific tasks. If you have an external hard disk, you can use it as both the startup drive and a storage disk.

Unless you specify otherwise, Lisa looks in drive 1, the upper built-in floppy disk drive, for the startup disk. Instructions for specifying the startup drive appear in Section E, Desktop Manager Reference Guide, in the manual that came with any Lisa tool, and in the System Utility section of the Lisa Development System manual.

You can also specify the startup device while turning the system on. This procedure is described below.

## Alternative Startup Procedure

To specify the startup device during system startup:

➤ Press the on-off button once to turn Lisa on.

➤ As soon as you hear the first click from Lisa (and before you hear the double click), hold down the Apple key while pressing one of the keys in the list below:

| | |
|---|---|
| 1 | Upper built-in drive |
| 2 | Lower built-in drive |
| 3 | ProFile attached to built-in parallel connector |
| 4 | Expansion card in slot 1 |
| 7 | Expansion card in slot 2 |
| a | Expansion card in slot 3 |

If you do not remember the keyboard codes for the device you want to use, you can ask Lisa for the Startup menu by following this procedure:

➤ Press the on-off button once to turn Lisa on.

➤ As soon as you hear the first click from Lisa (and before you hear the double click), press any key except [CAPS LOCK].

The Startup menu appears. (If you have just turned on a ProFile hard disk, Lisa may put up a Wait alert until the ProFile has finished its self-tests.)

➤ Use the mouse to select the startup device you want to use, or hold down the Apple key while pressing the number listed in the menu next to the device you want to use.

## Turning Lisa Off

When you are using Lisa's Desktop Manager, pushing the on-off button once to turn Lisa off does not instantly shut down the machine. Instead, it triggers a series of verification and storage procedures.

First, the computer suspends all documents on the desktop, putting a temporary copy of each onto its storage disk. The suspended documents are not saved; they are set aside in exactly the condition that you left them, including pointer position. If you have made changes to a document since you last saved it, the disk will contain two versions: One in the state it was in when saved, and one in the state it was in when suspended. As each document is suspended, it disappears from the screen.

If there is not enough room on a disk to store all of the documents on the desktop, Lisa terminates the power-down procedure. A message on the screen explains that there is not enough free disk space to complete the storage procedure. You can make room on the disk in two ways:

- Put away some of the documents so that Lisa does not have to keep two versions.

- Remove some old documents from the disk so that there is enough space for all the documents on the desktop.

When all of the resident documents on a diskette are stored, the diskette is released from its disk drive. When the desktop is clean, the startup diskette is released, the screen goes blank, and the power light goes out.

The point of this complex power-down procedure is that the next time you turn Lisa on, the computer can reconstruct the desktop exactly as you left it. During the next startup, Lisa checks all on-line storage devices and puts all documents that you had out back on the desktop. If Lisa was unplugged for more than 20 hours since it was last used, the power-up procedures may take considerably longer.

## APPENDIX 5. HARDWARE SPECIFICATIONS

### Size and Shape

- Cabinet
  - Height: 350 mm (13.8 in.)
  - Depth: 388 mm (15.2 in.)
  - Width: 475 mm (18.7 in.)
  - Weight: 22 kg (48 lbs.)
  - Cord length: 6.6 m (6 ft.)
- Keyboard
  - Height: 68 mm (2.7 in.)
  - Depth: 165 mm (6.5 in.)
  - Width: 475 mm (18.7 in.)
  - Weight: 18 kg (4 lbs.)
  - Cord length: 6.6 m (6 ft.)
- Mouse
  - Height: 38 mm (1.5 in.)
  - Depth: 94 mm (3.7 in.)
  - Width: 62 mm (2.4 in.)
  - Weight:
  - Cord length: 6.6 m (6 ft.)
  - Bearing diameter:
- ProFile
  - Height: 106 mm (4.2 in.)
  - Depth: 228 mm (8.6 in.)
  - Width: 434 mm (17.2 in.)
  - Weight:
  - Cord length: 6.6 m (6 ft.)

### Power Levels

- European/Asian Systems
  - Voltage: 180 to 260 VAC
  - Cycles: 48 to 68 Hz

- United States Systems
  - Voltage: 90 to 130 VAC
  - Cycles: 48 to 68 Hz

## Temperature Ranges

Storage: -22 C to 80 C (-8 F to 180 F)
Operation: 5 C to 42 C (40 F to 108 F)

## Humidity Ranges

Storage: 1% to 95%
Operation: 8% to 80%

## Capacity

Internal memory sizes:
Disk capacities
  Built-in drives: 860 Kilobytes (formatted) each
  ProFile: 5 Megabytes

## Video

Screen dimensions: 30 cm diagonal (15 cm by 22 cm active)
12 in. diagonal (6 in. by 8.5 in. active)
Resolution: 364 by 720 dots

## Compatabilities

Format: Standard ASCII characters and extended Apple
Recommended printers: Apple dot matrix and Apple daisy wheel

## Radio and Television Interference

Lisa generates and uses radio frequency energy. If Lisa is not installed and used properly (that is, in strict accordance with these instructions), it may cause interference to radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interfence will not occur in a particular installation, especially if a "rabbit ear" TV antenna is used. (A rabbit ear antenna is the telescoping rod antenna usually contained on TV receivers.)

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or its peripherals. To further isolate the problem:

- Disconnect the peripheral devices and their I/O cables one at a time. If the interference stops, it is caused by either the peripheral or its I/O cable. These devices usually require shielded I/O cables. For Apple peripherals, you can obtain the proper shielded cable from your dealer. For non-Apple peripherals, contact the manufacturer or your dealer for assistance.

If your computer does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- Turn the TV or radio antenna until the interference stops.

- Move the computer to one side or the other of the TV or radio.

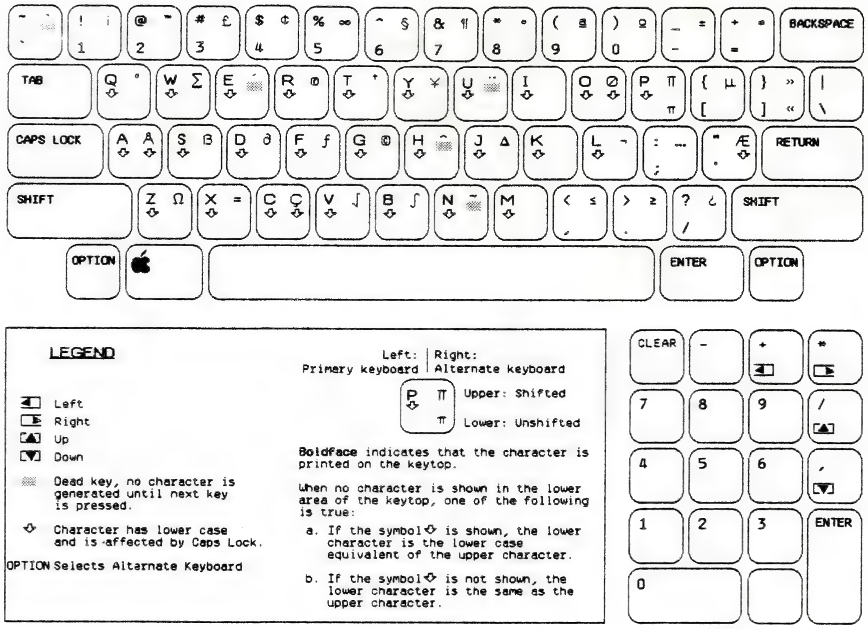
- Move the computer farther away from the TV or radio.

- Plug the computer into an outlet that is on a difference circuit from the TV or radio. (That is, make certain the computer and the TV or radio are on circuits controlled by different circuit breakers or fuses.)

- Consider installing a rooftop TV antenna with coaxial cable lead-in between the antenna and the TV.

If necessary, you should consult your dealer or an experienced radio/television technician for additional suggestions. You may find helpful the following booklet, prepared by the Federal Communications Commission: How to Identify and Resolve Radio-TV Interference Problems. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock Number 004-000-00345-4.

## US Keyboard Layout



**LEGEND**

◀ Left
▶ Right
▲ Up
▼ Down

▨ Dead key, no character is generated until next key is pressed.

⇩ Character has lower case and is affected by Caps Lock.

OPTION Selects Alternate Keyboard

Left: Primary keyboard | Right: Alternate keyboard

Upper: Shifted

Lower: Unshifted

**Boldface** indicates that the character is printed on the keytop.

When no character is shown in the lower area of the keytop, one of the following is true:

a. If the symbol ⇩ is shown, the lower character is the lower case equivalent of the upper character.

b. If the symbol ⇩ is not shown, the lower character is the same as the upper character.

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Profile

# Lisa

# PROFILE OWNER'S MANUAL

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# RADIO AND TELEVISION INTERFERENCE

The equipment described in this manual generates and uses radio frequency energy. If it is not installed and used properly, that is in strict accordance with our instructions, it may cause interference with radio and television reception.

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"How to Identify and Resolve Radio-TV Interference Problems"

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock number 004-000-00345-4.

## CAUTION

Your ProFile disk drive is a very delicate instrument.
Please handle it with care.

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# PREFACE

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Your ProFile disk drive is a valuable addition to your Lisa computer. It is extremely reliable, quiet, and very easy to use. This manual describes the drive and explains how to unpack, install, operate, and care for it.

Please insert this manual in the Peripherals binder that came in your Lisa accessories box.

Before reading this manual or attempting to use your ProFile, you should first read the manuals that accompanied your Lisa and become familiar with the operation of the computer.

Chapter 1 introduces you to the ProFile and explains how to unpack it.

Chapter 2 gives step-by-step instructions for connecting the ProFile to Lisa. This chapter also explains how to turn on the ProFile and provides information that prepares you to operate the drive.

Chapter 3 provides technical information on the structure and operation of the ProFile. This is strictly an informative chapter for those who have experience with computers and want to learn more about the internal architecture and functional operations of a disk drive. If you are not really interested in understanding the inside of your drive, you can skip this chapter.

The Appendix lists your ProFile's operating specifications. An Index follows the Appendix.

# CHAPTER 1. INTRODUCTION

## GETTING FAMILIAR

Powerful computers, such as Lisa, need large amounts of data storage in a physically small package. They also require their data storage systems to be highly reliable. Your new ProFile disk drive, Figure 1-1, satisfies both of these requirements.

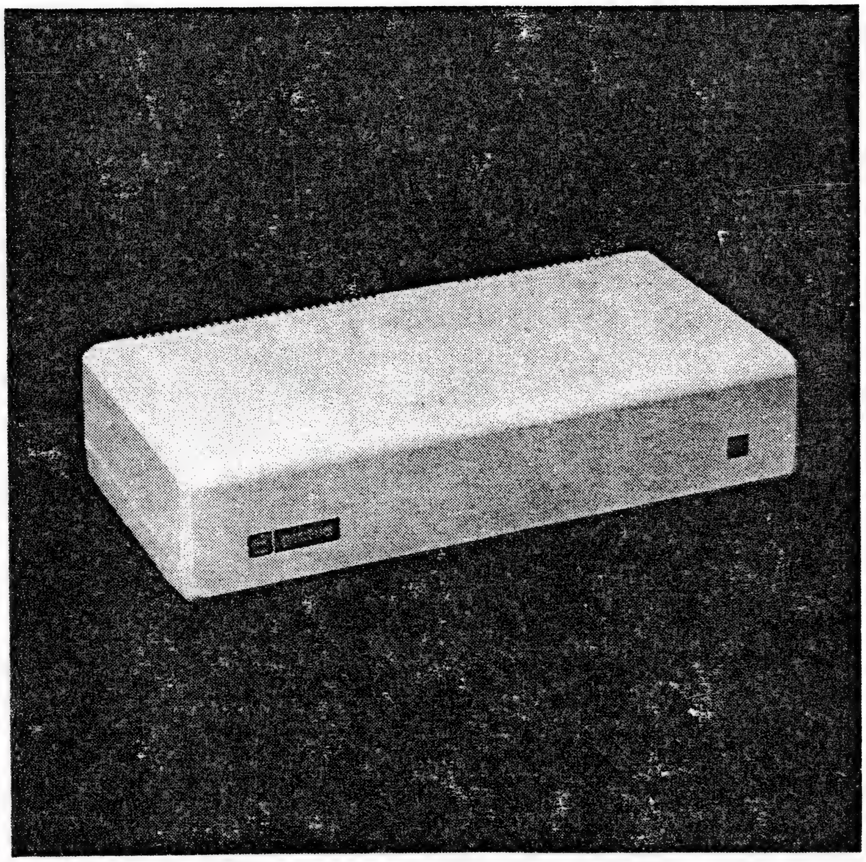


Figure 1-1. ProFile Disk Drive

Your ProFile is much different from the floppy disk drives built into your Lisa. For example, the ProFile stores information on rigid disks rather than floppy disks. Since the ProFile disks are protected by a sealed housing, they cannot be removed or interchanged and therefore cannot be damaged or lost as floppy disks can.

The main advantages ProFile has over a floppy disk drive are:

- Greater data storage capacity. ProFile can store nearly 5,000,000 bytes of data.
- Higher reliability.
- Improved performance.

## UNPACKING YOUR DRIVE

Your ProFile drive is packed in two shipping cartons. The larger of the two cartons contains your ProFile disk drive and unpacking instructions. The smaller, rectangular-shaped carton is your ProFile accessory kit. It contains this manual, a packing list, an interface cable, a power cable, and some important documents. Be sure to read the unpacking instructions entitled "How to Unpack the ProFile" before you start unpacking the drive. Then as you unpack the drive, check your packing list to make sure you have received all items listed.

The instructions that follow are similar to those outlined in "How to Unpack the ProFile." They are provided as a backup in case you lose the unpacking instructions.

WARNING: Your ProFile drive is a delicate instrument. Be very careful when you remove it from the shipping carton. Extensive damage may result if the unit is accidentally jarred, bumped, dropped, or handled roughly.

To unpack your ProFile, first open the large shipping carton containing the drive. Then lift off the thick foam lid that protects the top of the drive. Notice that the drive is packaged in a small cardboard container with hand cutouts on each side. Reach down with both hands, grasp the container by the hand cutouts, and carefully pull it straight upand out of the shipping carton as shown in Figure 1-2.

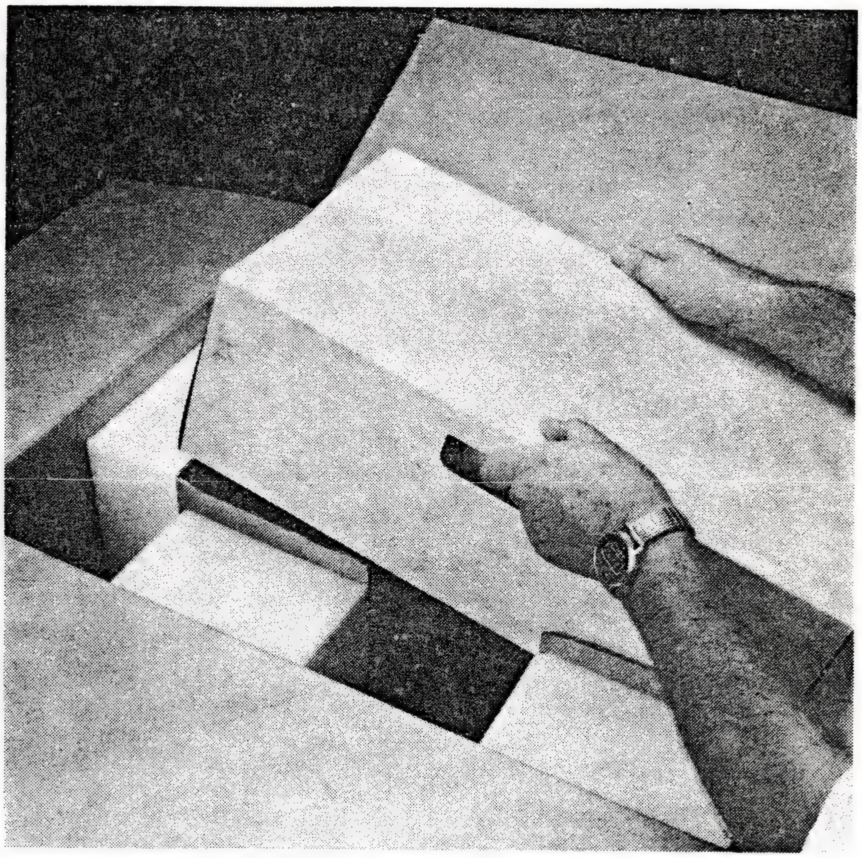


Figure 1-2. Removing the ProFile from the Shipping Carton

Open the container and remove the drive but do not remove the strapped-on foam end caps. Place the drive on a flat surface in the area where you intend to use it. See Figure 1-3.

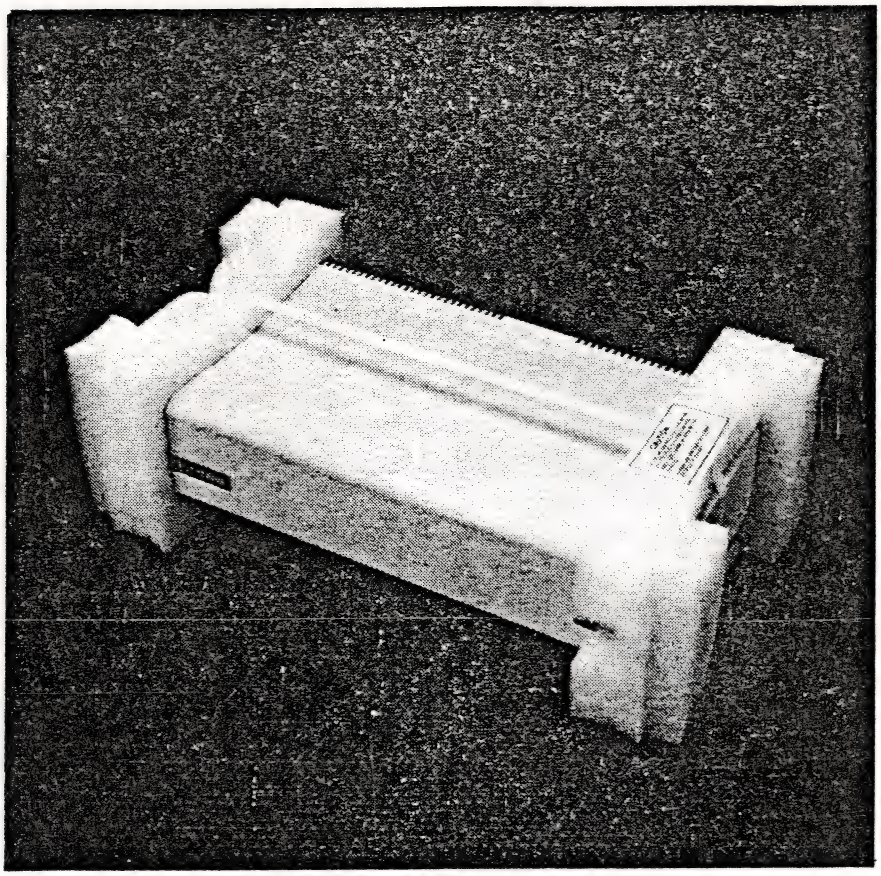


Figure 1-3. ProFile with End Caps Strapped On

As an added precaution against damage, you should leave the foam end caps strapped on until after you have turned on your drive for the first time. Then you can remove the foam end caps and set the drive on its feet. Be sure to save both the end caps and the carrying container. If you have to move your drive a short distance, for example from one building to another, you should strap on the end caps and carry the drive in the small carrying container.

Save the large carton and packing material in case you wish to ship your drive. Remember, if you attempt to ship the drive without proper packing, serious damage may result.

# CHAPTER 2. PREPARING TO USE YOUR PROFILE

## GETTING STARTED

Now that your ProFile is unpacked, you're probably eager to connect it to your Lisa to see how it works. However, before you remove the protective foam end caps and start hooking your ProFile up to Lisa, you should turn on the ProFile for the first time to make sure it starts up properly. Do this as follows:

1. Turn off the power switch on the back of the ProFile.

> WARNING: Your ProFile is equipped with a 3-wire power cord. As a safety feature, the plug is designed to fit only into a polarized, grounded, 3-hole outlet. If you are unable to insert the plug into the existing outlet, have a licensed electrician install a polarized, grounded 3-hole outlet (and a grounding conductor, if necessary). Do not defeat the purpose of the grounding-type plug.

2. Plug one end of the power cord into the recessed 3-pin connector on the back of the ProFile.

3. Plug the other end of the power cord into a wall outlet.

4. Turn on the power switch on the back of the ProFile.

Notice that the red Ready light on the front panel comes on for about 2 seconds and then goes off for about 20 seconds while the drive comes up to operating speed. Then the light starts to flash and continues to flash for about 40 seconds while the drive runs some internal tests on its disks. After that the light stays on continuously to indicate that the startup sequence is complete and the drive is ready for operation. Under certain conditions your drive could take up to 3 minutes to complete its startup sequence.

Failure of the Ready light to stay on after a maximum of 3 minutes indicates a possible drive malfunction. If this occurs, turn off your ProFile and contact your dealer for service.

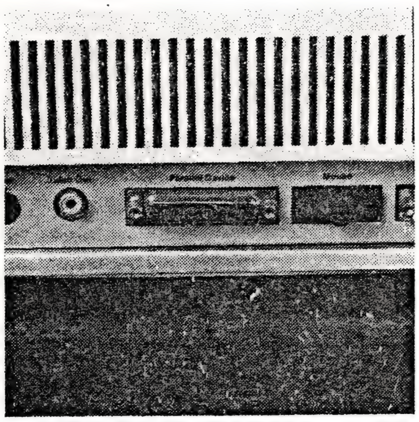
If the Ready light stays on, you are ready to connect your ProFile to Lisa. First turn off your drive and unplug the power cord from both the drive and the wall outlet. Next remove the foam end caps from the drive and place it as close as possible to Lisa.

WARNING: Never, under any circumstance, enclose your ProFile or place it on a thick carpet or any other surface that might obstruct air flow through the vents on the bottom of the unit.

## CONNECTING THE PROFILE

Your ProFile accessory kit includes a power cable and an interface cable. You will use the interface cable, a flat, ribbon-like cable with identical D-shaped connectors on each end, to connect your ProFile to Lisa.

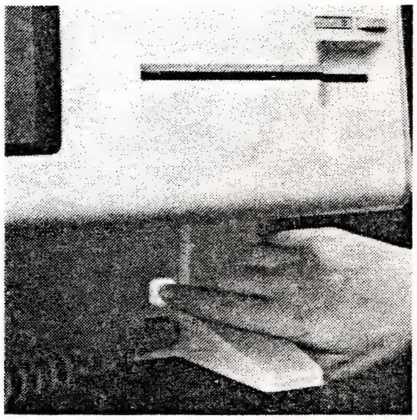
First locate the built-in parallel connector on the back of Lisa. If another parallel type device, for example a printer, is not already attached to this connector, you can connect your ProFile directly to it as described in the following steps.



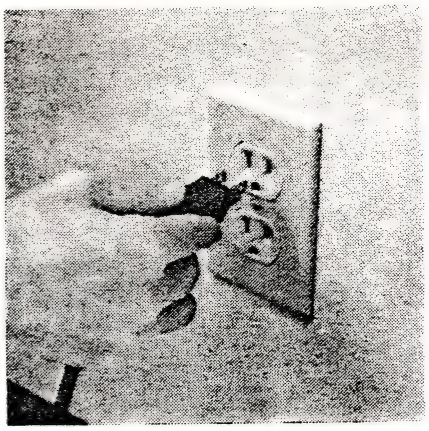
However, if the built-in parallel connector is already occupied, you can install a Parallel Interface Card in Lisa and connect your ProFile interface cable to this card. Refer to the documentation that came with your card for directions on how to install it.

To connect your ProFile to Lisa:

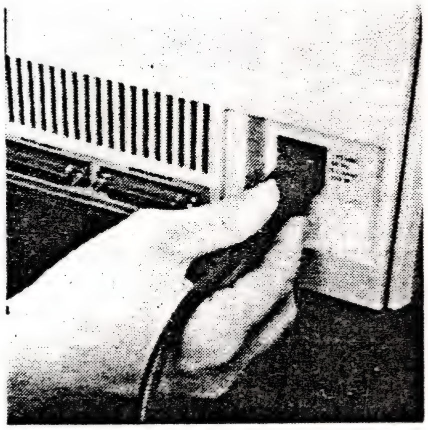
1. Turn off Lisa by pressing the power button. Wait until all diskettes are released and the power light is off.



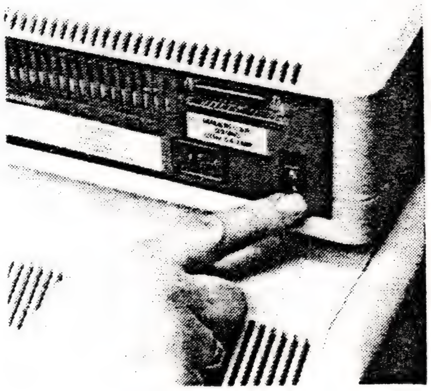
2. Turn off all peripherals. Unplug Lisa and all peripherals from the wall outlet.



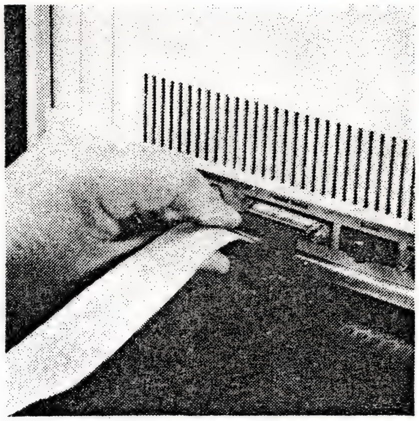
3. Turn Lisa so the back is facing you. Disconnect the power cord from the back of Lisa.



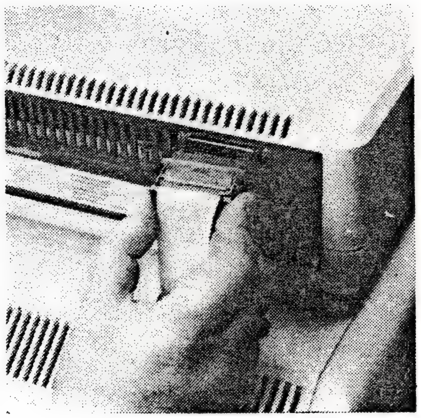
4. Make sure that the power switch on the ProFile is turned off.



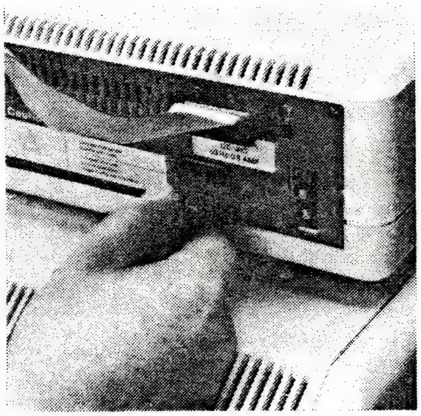
5. Plug one end of the interface cable into Lisa's D-shaped, parallel connector or one of the connectors on the Parallel Interface Card. The connector can go on in only one way because of its shape.



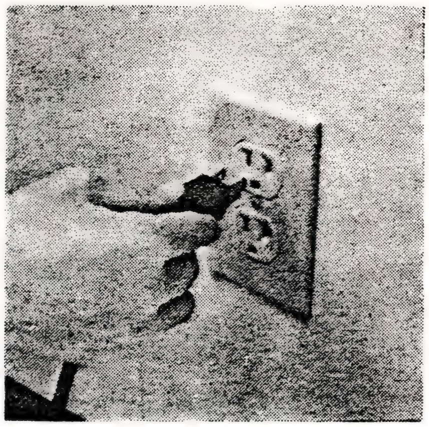
6. Plug the other end of the interface cable into the D-shaped mating connector on the back of the ProFile.



7. Plug one end of the power cord into the recessed 3-pin connector on the back of the ProFile.



8. Plug the other end of the power cord into a wall outlet.



9. Plug Lisa into a wall outlet.

## TURNING ON YOUR SYSTEM

Reach around to the back of the ProFile and turn on the power switch. The red Ready light should start to flash but in approximately 1 minute it will remain on continuously to indicate that your ProFile is ready for operation. The Ready light will also show activity by flashing rapidily whenever ProFile is communicating with Lisa.

## TURNING OFF YOUR SYSTEM

Observe the following precautions when turning off your ProFile.

- Do not turn off your drive while it is active (Ready light flashing). If you do, the read/write heads will settle over a data area instead of returning to their home position outside of the data area.
- When the drive is no longer active, make sure the Ready light remains on continuously for at least 4 seconds before turning off power.

## CONFIGURING YOUR SYSTEM

Before you can use your ProFile, you must configure it to your system. To do this, refer to the manual that came with any Lisa tool, Section E, Desktop Manager Reference Guide, under Set Hard Disk Connection, or the System Manager section of the Lisa Development System manual.

## OPERATING YOUR DRIVE

With the exception of the AC power switch, the ProFile drive contains no operating controls. After initial startup, all drive operations are controlled by Lisa.

## BACKING UP YOUR FILES

It is very important that you make a backup copy of the information you have stored on your ProFile in case you accidentally erase your data or lose it due to an equipment malfunction. To do this, refer to the manual that came with any Lisa tool, Section E, Desktop Manager Reference Guide, under Copy. If you are using systems software, refer to the Filer Section in the Lisa Development System manual.

## CARING FOR YOUR PROFILE

The ProFile disk drive, unlike the computer, is a mechanical device, with motors and moving parts. Therefore it is somewhat more delicate than the computer. The ProFile drive is completely aligned and tested at the factory, and with proper care and handling, it should provide trouble-free operation. However, rough handling, such as dropping the drive, sharply jarring it, or allowing heavy objects to fall on it, could cause damage.

## IF YOUR DRIVE DOESN'T WORK

If your ProFile does not operate, reread this manual carefully to make sure that the cables are properly connected. This cures most problems.

This isn't likely, but if your drive received excessive rough handling during shipping or unpacking, one of the connectors inside of the ProFile cabinet may be loose. If you suspect this condition, contact your dealer, who will be glad to help you.

Do not attempt to open the ProFile cabinet as this could void your warranty.

# CHAPTER 3. HOW THE DRIVE OPERATES

## BASIC FUNCTIONS

The ProFile disk storage system consists of a 5-1/4 inch disk drive, its controller card, and a power supply, all packaged in a compact cabinet, as shown in Figure 3-1.

Figure 3-1. ProFile Disk Storage System

The ProFile disk drive is a fixed-media, rotating memory, storage device, consisting of two rigid 5-1/4 inch disks, four read/write heads, a spindle drive mechanism, a positioning mechanism, and a recirculating air-filtration system. All of these components are enclosed in an environmentally sealed, protective, nonremovable aluminum housing called an HDA (head disk assembly). Analog and motor control cards are mounted beneath the HDA.

The ProFile disk storage system does the following:

- Moves the read/write heads to the desired track.
- Reads and writes data.
- Provides a contamination-free environment.

## Spindle Rotation

A brushless DC motor drives the spindle directly at a rotational speed of 3600 rpm (no belt or pulley is used). A mechanical brake ensures a fast stop of the spindle drive motor whenever you turn off the ProFile.

## Head Positioning

An open loop stepper system moves the read/write heads. The heads are attached to a carriage that is driven and positioned by a band actuator connected to the capstan shaft of a stepper motor. See Figure 3-2. The heads are positioned by wrapping and unwrapping the band around the capstan.

Figure 3-2. Positioning Mechanism

### Read/Write Heads and Disks

The drive uses two nonremovable 5-1/4 inch disks as storage media. Each disk consists of an aluminum substrate covered on each side with a lubricated, thin, magnetic oxide coating. This coating formulation, together with the low load force/low mass of the Winchester-type heads, permits the heads to contact the disk surface during start/stop operations. Each of the four read/write heads (one per disk surface) accesses 152 data tracks. The total formatted capacity of the ProFile drive is approximately 5 megabytes.

### Air Filtration System

An internal recirculating air system with an absolute filter maintains a clean environment within the HDA. Integral to the filter is a port that permits ambient air to equalize pressure without causing contamination. The filter never requires cleaning or replacement.

## DRIVE ELECTRONICS

The ProFile electronics consist of a controller card, an analog card, a motor control card, and a power supply. These components are packaged, together with the HDA, in the ProFile cabinet. A 25-conductor interface cable connects the ProFile's controller card to Lisa. This cable contains eight bidirectional data lines and five control lines.

## CONTROLLER CARD

The controller card is mounted on top of the power supply in the ProFile cabinet. It has four main sections; a microprocessor, a random access memory (RAM), serializing/deserializing and error detection logic, and read/write control logic.

The controller :

- Communicates with Lisa.
- Selects the read/write head and moves it to the proper track.
- Provides signals to read and write serial data on the disk.
- Converts 8-bit parallel data from the computer into serial data for the drive during a write operation.
- Converts serial data from the drive into 8-bit parallel data for the computer during a read operation.
- Continuously monitors the ProFile for error conditions.

During the first 60 seconds after you turn on the ProFile, the controller performs a surface analysis, checks the data integrity of all sectors, and spares out any marginal sectors automatically. If a head positioning error is detected, the controller will automatically attempt to reposition the heads to the proper track location. If a read error occurs during operation, the controller retries the data and attempts to recover from the error automatically. If the error rate for a given sector is too high, the controller will automatically "spare" it (relocate the sector data to another area of the disk). The controller will attempt to spare a sector on a read operation only if valid data has not been recovered from the sector. If valid data cannot be recovered, the sector will be flagged as bad and a sparing attempt will be made on the next write or write/verify operation.

The microprocessor section supervises the controller hardware through signals on its input/output (I/O) ports and control information stored in the RAM. The microprocessor directly controls the two-phase stepper motor to move the actuator and heads from track to track, selects one of four read/write heads, and writes sector marks on the disk during the format operation (each track is divided into 16 sectors whose boundaries are defined by sector marks).

Under direction of the microprocessor, the controller's read/write control logic converts parallel data to serial data when writing and serial data to parallel data when reading, controls the transfer of data to and from the RAM, and controls the error detection logic.

This logic detects errors in data read from the disk and outputs an error signal to the microprocessor. As a result, the controller tries again to read the data. Normally one or two retries will result in a successful read.

## ANALOG CARD

The analog card is the interface between the controller card and the HDA. It is mounted on the bottom of the HDA and is primarily dedicated to read/write functions. The analog card includes a write encoder, write driver, head select matrix, preamplifier, read detector, and sector detector.

The head select matrix selects one of the four read/write heads for a read or write operation.

During a write operation, the write circuit receives serialized digital data pulses from the controller and converts them into an encoded data stream of current reversals for the selected head. These current reversals are recorded on the disk surface as a series of polarity reversals (flux changes) having the same timing relationships as the encoded data.

During a read operation, the selected read/write head transforms the polarity reversals (flux changes) on the disk surface into an encoded data stream. The read circuit separates the encoded read data into streams of serialized digital clock and data pulses and sends them to the controller.

## MOTOR CONTROL CARD

The motor control card is a small card mounted between the HDA and the analog card. Its function is to maintain spindle rotation speed at 3600 RPM, plus or minus 1 percent.

## POWER SUPPLY

The power supply provides operating voltages of +5V, +12V, and -12V to the ProFile electronics.

## APPENDIX A. OPERATING SPECIFICATIONS

### STORAGE CHARACTERISTICS

| | |
|---|---|
| Data capacity (formatted) | 4,980,736 bytes |
| Data surfaces | 4 |
| Heads per surface | 1 |
| Tracks per surface | 152 |
| Track spacing | 254 tracks per inch |
| Bytes per block | 512 |
| Blocks per track | 16 |
| Blocks per surface | 2432 |
| Total number of blocks | 9728 |

### DRIVE CHARACTERISTICS

| | |
|---|---|
| Seek time distribution | 330 tracks per second |
| Average seek time | 180 milliseconds |
| Data transfer rate | 5 megabits/second |
| Rotational speed | 3600 RPM |
| Rotational startup time | 20 seconds |
| Drive ready to operate | 60 seconds |

### ENVIRONMENTAL CHARACTERISTICS

| | |
|---|---|
| Operating temperature | 10°C (50°F) to 40°C (104°F) |
| Storage temperature | -22°C (-7.6°F) to 80°C (176°F) |
| Operating humidity | 8% to 80% (no condensation) |
| Storage humidity | 1% to 95% |

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Parallel Interface Card

# Parallel Interface Board

Lisa Manual

Alpha Draft

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## PREFACE

This manual will tell you everything you need to know about your Parallel Interface Board. The board allows you to attach more than one parallel device to your Lisa, giving you wide flexibility in total system configuration.

Chapter 1 is an introduction to the board, telling you its major features and uses. Chapter 2 details the installation of the board. This is the only procedure you need to perform in order to use the parallel interface board.

Two technical appendices provide reference information about the interface board. Most readers will not need this information. Appendix A contains the basic technical specifications for the board, and Appendix B provides a more detailed summary of the technical issues most important to the board's use. These appendices are designed for reference, and need never be applied by the user in normal operation of the product.

# CHAPTER 1. INTRODUCTION

The Parallel Interface Board connects parallel peripherals to the Lisa. The Lisa contains one built-in interface to parallel devices, and each Parallel Interface Board enables the Lisa to support two more of these peripherals. The board can be easily installed into one of the three Lisa expansion slots.

Since the Lisa contains a built-in parallel interface, a Parallel Interface Board is only required when you have more than one parallel device. Examples of Lisa configurations requiring a parallel board include the following:

- Lisa + Profile hard disk + Apple Dot Matrix Printer
- Lisa + 2 Profile hard disks

The board has these general features:

- Any device that uses Apple's standard parallel interface can be connected to the board. This includes the Profile hard disk and the Apple Dot Matrix Printer.
- Since each Parallel Board contains two ports and an additional parallel port is built into Lisa, the system can support as many as seven separate peripherals on parallel interfaces.
- Installation of board is simple, even for beginners. Just slip the board into any one of Lisa's three expansion slots.
- The board transfers data at a maximum rate of 625K bytes/second.
- Several read/write handshake modes are supported, allowing several peripheral interfaces.
- Four programmable timers are available for software.
- The board allows the Lisa to boot from attached peripherals.

- The board's ports use the same software command format as Lisa's built-in parallel interface.
- Standard port control is based on the 6522 Versatile Interface Adapter.
- The software driving the board may use system interrupts.
- There is a parity check on data lines.
- Self-test diagnostics verify the board's correct operation.

# CHAPTER 2. INSTALLING THE PARALLEL INTERFACE BOARD

Once you have your Lisa and your Parallel Interface Board, installing the board is a simnple process. Follow these instructions:

1. Turn off the Lisa by pressing the power button. Wait until all diskettes are released and the power light is off.

2. Turn off all peripherals. Unplug the Lisa and all peripherals from the wall outlet.

3. Turn the Lisa so the back is facing you. Disconnect the power cord from the back of the Lisa.

4. Remove any cables extending from expansion boards in the lower left of the back panel.

5. Remove the back panel:

   - Turn the two thumbscrews along the upper edge clockwise until they will not turn any further (these screws will loosen but will not come free from the back panel).

   - Pull the panel towards you and up.

6. Determine which is the three expansion slots (on the lower left of the board cage) will hold the board.

7. Pull out the metal lever extending from the yellow cap at the bottom of the slot.

8. Turn the lever 90 degrees clockwise, to a 3 o'clock position.

9. Hold the Parallel Interface Board by the metal frame, with the green plastic facing right and the white cover facing left. Insert the bottom of the board into the connector slot, and the top of the board into the plastic slot above the connector. Slide the board in until it stops. The board should be flush with the front of the connector.

10. Turn the metal lever 90 degrees counter-clockwise, to the 12 o'clock position.

11. Push the lever back into the plastic cap.

12. If you have just installed the board into a slot which did not previously contain a board, follow steps a through e, below, for removing the board cover on the back panel of Lisa. Otherwise, skip these steps and go to step 13 for directions on replacing the back panel.

    a. On the back panel, locate the board cover for the board you just installed.

    b. If you do not have a screwdriver, use a coin to loosen the screw at the top of the metal plate. Pull the plate out from behind the retaining tab and over the screw head.

    c. Loosen one of the three screws in the middle of the back panel.

    d. Slide the metal plate over the screw head and behind the retaining tab.

    e. Tighten both screws.

13. Replace the back panel as follows:

    a. Make sure the metal tabs attached to the two screws are pointed to the left.

    b. Insert the tabs along the lower edge of the back panel into the slots at the base of Lisa.

    c. Push the panel flat against the back of the Lisa.

    d. Turn the two thumbscrews clockwise until they are snug.

14. Reattach any connectors you removed from the expansion boards or the bottom edge of the back panel.

15. Reconnect the power cord, plugging if first into the back of the Lisa, then into the wall outlet.

## APPENDIX A. TECHNICAL APPENDIX

### OVERVIEW

The two ports on the board are electronically similar to the parallel port built into the Lisa system, so software driving the internal port can also drive the external parallel ports with little modification. There is also a ROM on the board which contains self-test diagnosic software as well as a program that allows Lisa to boot from peripherals attached to the ports.

### TECHNICAL SPECIFICATIONS

- Two parallel interface ports
- Standard Apple parallel interface protocol
- 2K Bytes on-board ROM
- Allows system booting from port
- Self-test diagnostics
- 625K bytes/second maximum data transfer rate
- Port control based on 6522 Versatile Interface Adapters
- Supports several read/write handshake modes
- 4 programmable timers
- Interrupt capability
- Parity check on data lines
- Dimensions: 9.3" high x 5" wide x 0.7" deep
  (236mm x 127mm x 18mm)
- Power consumption: 1 Amp @ 5 Volts

## ELECTRICAL DESCRIPTION

The parallel port electronics consist basically of two 6522 Versatile Interface Adapter (VIA) chips. Each VIA contains two 8-bit parallel ports, associated handshake signals, programmable timer/counter and shift register. See the 6522 data sheet for more information. One 6522 is dedicated to each parallel port.

The pin functions are as follows:

| | |
|---|---|
| DD0-DD7 | Eight bidirectional data lines. DD7 is the most significant bit. |
| RW | Read/write. The Lisa drives this line high to indicate that it expects data to be input on the data lines. The Lisa drives this line low when there is data to output. |
| PARITY | Bidirectional line which must be configured on the basis of data currently on the data lines to give odd parity. |
| PSTRB/ | Processor strobe line used as a signal by the Lisa to indicate valid data being output. |
| CMD/ | The Lisa asserts this line to indicate that a command has been placed on the data lines. |
| BSY/ | The attached periperhal asserts this line to indicate that it is busy and unable to process commands on the interface. |
| OCD | If this line is high, Lisa assumes no device is connected to the port. |
| CRES/ | Lisa asserts this line to reset the peripheral to its power-on state. |
| CHK/ | This signal may be used to interrupt the CPU in the event that a fault condition has occurred in the device connected to the port. |

Table 1 shows the signals on the parallel port DB-25 connector and their respective connections to a 6522 chip. PBx corresponds to port B, bit x on a 6522 chip, and CAx and CBx are control input/output bits. See the 6522 data sheet for more information.

| Signal | Pin | Port Connection |
|---|---|---|
| PSTRB | 15 | CA2 |
| R/W | 3 | PB3 |
| CMD | 17 | PB4 |
| CHK | 25 | CB1 |
| BSY | 16 | PB1,CA1 |
| OCD | 19 | PB0 |
| CRES (out) | 21 | PB7 |
| CRES (in) | 21 | PB5 |
| Reset Parity | -- | PB5 |
| Parity Latch | -- | CB2 |

Table 1. Parallel Port Pin Assignments and Connections

## SOFTWARE CONSIDERATIONS

See the 6522 data sheet fopr information regarding programming the 6522 chip registers and I/O ports. Basic port addresses are shown in Table 2; add $2000_H$, $6000_H$, or $A000_H$ to these addresses depending on whether the Parallel Board is in slot 1, 2, or 3 respectively. Note that these addresses are in system I/O space, as defined in the Lisa Hardware Reference Manual.

The built-in 2K byte ROM starts at 0, $4000_H$, or $8000_H$, depending on which slot is being used. The byte-wide ROM appears in the low (D0-D7) byte of each word.

| Register | Reg # | Port A Address (Hex) | Port B Address (Hex) |
|---|---|---|---|
| ORB/IRB | 0 | 0 | 800 |
| ORA/IRA (w/hndshk) | 1 | 09 | 809 |
| DDRB | 2 | 11 | 811 |
| DDRA | 3 | 19 | 819 |
| T1C-L | 4 | 21 | 821 |
| T1C-H | 5 | 29 | 829 |
| T1L-L | 6 | 31 | 831 |
| T1L-H | 7 | 39 | 839 |
| T2C-L | 8 | 41 | 841 |
| T2C-H | 9 | 49 | 849 |
| SR | 10 | 51 | 851 |
| ACR | 11 | 59 | 859 |
| PCR | 12 | 61 | 861 |
| IFR | 13 | 69 | 869 |
| IER | 14 | 71 | 871 |
| ORA/IRA (no hndshk) | 15 | 79 | 879 |

Table 2. 6522 Register Addresses

## DIFFERENCES FROM LISA INTERNAL PORT

As mentioned above, both the Lisa and the Parallel Interface Board use 6522 VIAs to drive the parallel ports. However, there are a fewm minor differences that the programmer should note.

1. Timing. The Lisa parallel port is driven by a 500 kHz clock. The Parallel Board supports a faster clock operating at 1.25 MHz. This affects software using 6522 internal timers.

2. Port Connections. Software driving the Lisa internal port references signals through two 6522 chips (see the Lisa Hardware Reference Manual for more information). The Parallel Board connects signals for a single port in a single 6522.